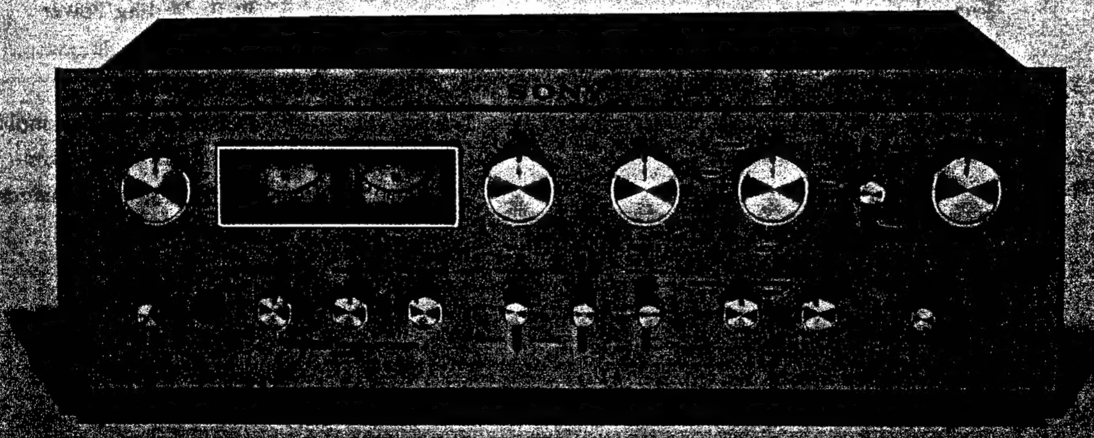
TA-2000F

Set using ISO screws

23 76

General Export Model



SONY

SERVICE MANUAL

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SERVICING NOTES

The FET's used in the TA-2000F are selected according to their Idss rank, so use replacement FET's with the exact same Idss rank.

Idss rank is indicated by the identification number, as shown in Fig. A.

On all plug-in type PC boards except the MUTING/POWER SUPPLY board, left- and right-channel conductor-side patterns are designed symmetrically. This makes a trouble check possible through interchange of channels by reinserting the boards upside down.

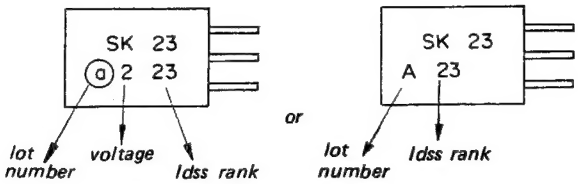


Fig. A Example of Idss rank

SECTION 1
TECHNICAL DESCRIPTION

1-1. TECHNICAL SPECIFICATIONS

Technical specifications for the TA-2000F are given in Table 1-1.

TABLE 1-1. SPECIFICATIONS

Frequency response:	PHONO-1, 2	RIAA curve ±0.5 dB
	MIC	30 Hz to 30 kHz $\pm^{0}_{2}$ dB
	TUNER, AUX 1, 2, 3, TAPE 1, 2, REC/PB (input)	10 Hz to 100 kHz $\pm^{0}_{2}$ dB
Input sensitivity and impedance:	PHONO-1 (HIGH LEVEL)	1.2 mV 33k, 47k, 82k
	(LOW LEVEL)	0.06 mV 10 ohm, 30 ohm
	PHONO-2	1.2 mV 47k
	MIC	0.5 mV 100k
	TUNER, AUX 1, 2, 3, TAPE 1, 2, REC/PB (input)	110 mV 100k
Maximum input capability:	PHONO-1 (HIGH LEVEL)	300 mV
	(LOW LEVEL)	15 mV
	PHONO-2	300 mV
	MIC	1,200 mV
Signal output level and impedance:	OUTPUT 1, 2	1 V 3k; 0.3 V 6k
	REC OUT 1, 2	100 mV 10k (max 30 V)
	CENTER	5 V 2.6k
	HEADPHONE OUT	0.5 V (8 ohm load)
	REC/PB (output)	30 mV 82k
Signal-to-noise ratio:	PHONO 1 (HIGH LEVEL)	greater than 73 dB (weighting network A)
	(LOW LEVEL)	greater than 50 dB (weighting network B)
	PHONO 2	greater than 73 dB (weighting network A)
	MIC	greater than 50 dB (weighting network B)
	TUNER, AUX 1, 2, 3, TAPE 1, 2, REC/PB (input)	greater than 90 dB (weighting network A)
Tone controls:	BASS	±10 dB at 50 Hz (TURNOVER FREQ. 250 Hz); ±10 dB at 100 Hz (TURNOVER FREQ. 500 Hz)
	TREBLE	±10 dB at 10 kHz (TURNOVER FREQ. 2.5 kHz); ±10 dB at 20 kHz (TURNOVER FREQ. 5 kHz)
Filters:	LOW:	12 dB/oct, below 50 Hz
	HIGH:	12 dB/oct, above 9 kHz
Harmonic distortion:		Less than 0.03% at rated output, 1 kHz
IM distortion: (60 Hz:7 kHz = 4:1)		Less than 0.05% at rated output
Power consumption:		23 watts
Power requirements:		100, 117, 220 or 240 V ac, 50/60 Hz
Dimensions:		400 mm (width) × 149 mm (height) × 315 mm (depth); $15\frac{3}{4}$" (width) × $5\frac{13}{16}$" (height) × $12\frac{7}{8}$" (depth)
Net weight:		9 kg (19 lb 12 oz)
Shipping weight:		11.2 kg (24 lb 12 oz)

1-2. DETAILED CIRCUIT ANALYSIS

The following text describes the function or operation of all stages and controls. The text sequence follows signal paths. Stages are listed by transistor reference designation at the left margin; major components are also listed in a similar manner. Refer to the block diagram on page 9 and the schematic diagram on pages 35 to 36.

PHONO-1 Equalizer/Head Amp

Stage/Control	*Function*
Head Amplifier Q101	Amplifies extremely small input signals (as from a moving-coil type cartridge) to the level required at following equalizer amplifier. A common-gate configuration is suited to this job because it has low input impedance and high voltage gain. Input signal applied to the PHONO-1 terminal is routed to this amplifier only when IMPEDANCE SELECTOR switch S10 is set to the 30 ohm or 10 ohm position.
IMPEDANCE SELECTOR switch S10	S10 changes the PHONO-1 input impedance to meet the cartridge manufacturer's recommended load impedance because of its effect upon frequency response.
Equalizer Amplifier Q102, Q103 Q104, Q105 Q106	This newly developed direct-coupled four stage amplifier amplifies the phono cartridge signals to the level required at the input of the following tone-amplifier. Q102 forms a conventional FET amplifier while Q103 and Q104 act as buffer amplifier which has a high input impedance. This FET-PNP combination amplifier forms a modified source-follower circuit in which Q104 acts not only as constant-current source, but also as a drive amplifier for the negative-going half cycle. This has the advantage of low harmonic distortion and wide dynamic range. In addition, the FET generates less noise than a conventional silicon transistor. The FET's used in TA-2000F are selected according to their Idss rank, and care should be taken to use replacement FET's with the exact same Idss. Idss is indicated by the identification number, as illustrated in Fig. 1-1. Note that Q105 and Q104 are newly developed high-voltage transistors which make the wide linearity (dynamic range) possible. For this purpose, a 150-volt power supply is employed.

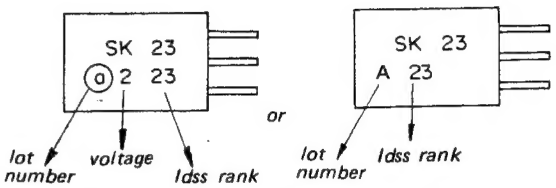


Fig. 1-1. Example of Idss rank

Stage/Control	*Function*
Bias circuit	Dc bias voltage for Q102 is determined by the current flow in source resistor R112, and the dc negative feedback voltage applied to the gate of Q102 from the emitter circuit of Q105 through R110, R107 and R109. This dc negative feedback technique provides stable operation. Dc bias voltage of Q103 is determined by the drain voltage of Q102 and the current flow in the Q103 (which is restricted by its Idss). Current flow in Q103 also determines the bias voltage applied to the Q104 and Q105 as they are directly coupled.
Equalization circuit	RIAA equalization is achieved by the negative-feedback loop containing R117, R118, R119, C110 and C109. Be sure to use replacement components with the exact same values. The equalizer amplifier's output is fed to the FUNCTION-2 switch through R120 (1 kΩ) to prevent interaction between the left and right channels when the MODE switch is set to L + R.

Stage/Control	*Function*
MIC Amplifier/PHONO-2 Equalizer Amplifier Section	
MIC Amplifier Q301, Q302 Q303, Q304	The MIC amplifier consists of two pairs of FET-NPN amplifiers. They amplify the signals provided by the microphones to the level required at the input of the tone-amplifier. An FET has high input impedance and generates less noise than conventional silicon transistors. Therefore, FET's are employed in the low-level amplifiers. Note the high-voltage transistor Q302 (Q304) employed in the second-stage amplifier. This eliminates distortion due to strong input signal causing saturation in the low-level amplifier.
Bias circuit	Dc bias voltage for Q301 is determined by the current flow in the source resistor R306, and the dc negative feedback voltage applied to the gate of Q301 from the emitter circuit of Q302 through R304 and R302.
MIC amplifier Q303, Q304	Q303 and Q304's operation is the same as described in Q302 and Q303. Note that the last stage (Q304) is a conventional transistor since the high-level input signal is sufficiently attenuated by means of MIC LEVEL control VR6 so as not to saturate Q303 and Q304.
MIC LEVEL control VR6 mixing switch S15	The MIC LEVEL control and mixing switch S15 are mechanically connected to perform the mixing operation.
PHONO-2 Equalizer Amplifier Q305, Q306 Q307, Q308 Q309	Same as described in PHONO-1 equalizer amplifier section except for reference numbers. Note that the output of this amplifier can be controlled by means of VR1, LEVEL ADJUST.
Function switch	Input signals applied to the TAPE-1, TUNER, AUX-1, AUX-2 input terminals are controlled respectively by means of VR5, VR2, VR3 and VR4. All input signals are routed to FUNCTION-1 or FUNCTION-2 switches. Note that the TAPE-TO-TAPE positions in the FUNCTION-1 switch are provided for tape duplicating as noted in Table 1-2.

TABLE 1-2.

FUNCTION-1 Position	Tape Recorder-1	Tape Recorder-2
TAPE-TO-TAPE 1-2	Playback	Recording
TAPE-TO-TAPE 2-1	Recording	Playback

Stage/Control	*Function*
REC OUT Buffer Amp Q01, Q51	All input signals are equalized or controlled by means of equalizer or LEVEL ADJUST resistors, and then fed to the FUNCTION switches. The signals for REC OUT are extracted from the signal path between the FUNCTION switches and MODE switch, and then fed to each set of REC OUT terminals through buffer amplifier (emitter follower) Q01. Q01 eliminates interaction between the tape recorder and the TA-2000F's signal path. Note that Q01's output is routed through muting relay REL-1.
MONITOR switch S3	In the TAPE-1 position, input signals connected to either the TAPE-1 terminal or REC/PB connector is selected. In the TAPE-2 position, the input program connected to the TAPE-2 terminal is selected. In the SOURCE position, all other program sources are selected.
MODE switch	Selects the desired mode of operation. This switch may also be used for test purposes. The relation between the positions of the MODE switch and outputs of the set are summarized in Table 1-3.
BALANCE control VR7	Input signal is routed to the BALANCE control through MODE switch S4. This is done to optimize stereo reproduction. To eliminate insertion loss at

Stage/Control	*Function*
	the mechanical center of movement, a special potentiometer having a conductive coating over half its element length is used.
VOLUME control VR8	The balanced input signals from BALANCE control VR7 is fed to VOLUME control VR8, which regulates the signal applied to the following tone-control circuit or output circuit.

Tone Amplifier Section

Tone Amplifier Q501, Q502 Q503	This three-stage amplifier has basically flat response, and provides 20 dB voltage gain to compensate for tone-control insertion loss. It also isolates the volume-control and tone-control circuits to eliminate mutual interference. The input signals are amplified by Q501 and Q502, and then applied to source follower Q503.
Bias circuit	Bias voltage for Q501, Q502 and Q503 is determined by the current flow in their respective source resistors. Negative feedback is applied from the source circuit of Q503 to the source circuit of Q501 through C505, R509, and C506 to obtain a flat and wide response. Tone-amplifier-1's output is fed to an RC-type tone-control circuit
TONE CANCEL SW S5	through TONE CANCEL switch S5 when S5 is set to "ON".

Stage/Control	*Function*

Tone Control Section

	All inputs are applied this circuit when TONE CANCEL switch S5 is set at ON. Fig. 1-2 shows the simplified circuit of tone control incorporated with the treble and bass turnover switches.
TREBLE control S6	Increases or decreases the amount of high-frequency components by switching the resistors connected to S6 in steps.
TREBLE TURNOVER FREQUENCY switch	S8 selects the specified turn over frequencies (2.5 kHz or 5 kHz). Refer to Fig. 1-3.
BASS control S7	Increases or decreases the amount of low frequency components by switching the resistors connected to S7 in steps.

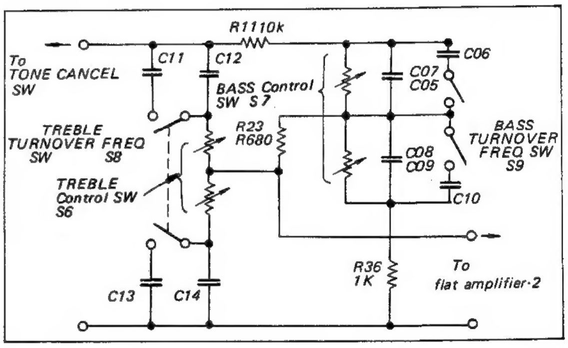
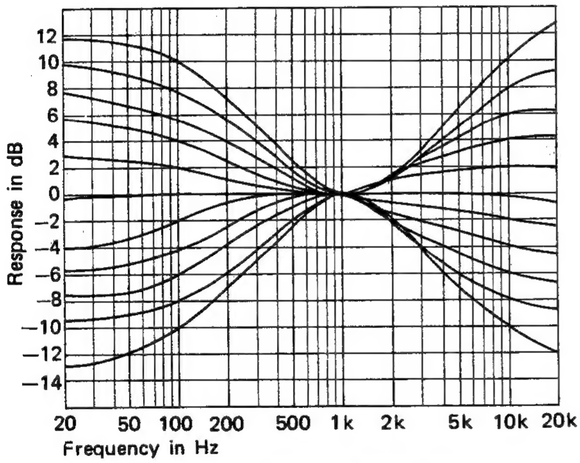


Fig. 1-2. Simplified tone control network

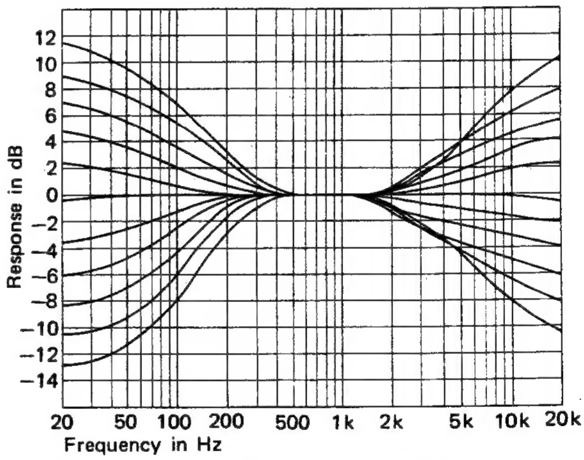
TABLE 1-3. OUTPUTS

MODE SWITCH POSITION	CENTER CHANNEL OUT	HEADPHONE OUT;		RECOUT-1, 2, REC/PB OUT;		OUTPUT	
		L-CH	R-CH	L-CH	R-CH	L-CH	R-CH
CHECK L	L + R	L + R		L + R	L + R	L + R	
CHECK R	L + R		L + R	L + R	L + R		L + R
REVERSE	L + R	R	L	L	R	R	L
STEREO	L + R	L	R	L	R	L	R
L + R	L + R	L + R	L + R	L + R	L + R	L + R	L + R
LEFT	L	L	L	L	R	L	L
RIGHT	R	R	R	L	R	R	R

Stage/Control	*Function*
BASS TURNOVER FREQUENCY switch S9	S9 selects the specified turnover frequencies (500 Hz or 250 Hz). Refer to the Fig. 1-3 (tone control response). When TONE CANCEL switch S5 is set to CANCEL, the line signal is bypassed around the tone-control circuit and is fed directly to the output circuit through FILTER switch S11.
Tone-amplifier-2 Q504, Q505, Q506	Same as tone-amplifier-1 except for reference numbers.
FILTER switch S11	Selects the desired filtering operation. LC filter circuits are employed to eliminate insertion loss.
LOW(50 Hz) position	Low-cut filter (C15, L01) cuts out unwanted low frequency components from the input signals (12 dB/oct below 50 Hz). These unwanted low frequencies include rumble created by the turntable, record changer, or the record itself. See Fig. 1-4.
OFF position	All filter circuits are removed from signal paths and have no effect upon frequency response.
HIGH (9 kHz) position	High-cut filter (L02, C16) cuts out unwanted high-frequency components from the input signals (12 dB/oct above 9 kHz). These unwanted high frequencies include hiss noise created by tape deck or tape itself. See Fig. 1-4.
BOTH position	Both low- and high-cut filters are effective. See Fig. 1-4. The signal from the FILTER switch is routed to the OUTPUT jacks through OUTPUT LEVEL switch S13.

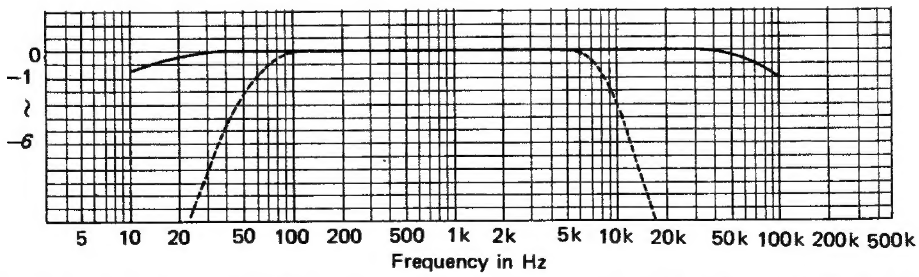


TURNOVER FREQuency: BASS 500 Hz
TREBLE 2.5 kHz



TURNOVER FREQuency: BASS 250 Hz
TREBLE 5 kHz

Fig. 1-3. Tone control frequency response



Input signal applied to TUNER inputs *Output: 1 volt (OUTPUT LEVEL switch set to 1 V)*
VOLUME control: maximum clockwise *TONE CANCEL switch: CANCEL position*
FILTER switch: OFF position ————
BOTH position - - - - - - - -

Fig. 1-4. Filter response

Stage/Control	*Function*
OUTPUT LEVEL switch S13	The output voltage can be changed by S11, which has two calibrated positions (0.3V and 1.0V), and should be set according to the requirements of the equipment to be connected. Note that the signal supplied to the OUTPUT-2 terminal is routed through the leaf switch in the HEADPHONE jack. As the result, no signal will appear at the OUTPUT-2 terminal during headphone monitoring.

Meter Amplifier/Headphone Amplifier Section

Stage/Control	*Function*
METER LEVEL switch S12	Level meter sensitivity can be varied by switching S12. In 0dB position, the reading on the meter shows the actual output value. In the -10 (-20) dB position, the sensitivity of the meter increases 10 (20) dB up from the 0 dB position. Output signal is routed to meter amplifier through METER LEVEL switch S12 to permit VU meter monitoring. In the MIC position, only the MIC amplifier's output is fed directly to the meter amplifier.
Meter amplifier Q701, Q702 Q703	This three-stage direct-coupled amplifier increases the extracted output signals to the level required to drive the level meter. The meter amplifier output is rectified and supplied to the VU meter through bridge rectifier diodes D701 ~ D704.
Level meter adj. R701	Semifixed resistor R701 in the meter amplifier calibrates the VU meter.
Headphone amplifier Q704, Q705 Q706, Q707 HEADPHONE LEVEL VR9	Supplies enough power to drive the headphone used for monitoring. The output signal is controlled by means of HEADPHONE LEVEL control VR9. Q704 is a preamplifier which increases the input signal to the level required at the following driver stage.

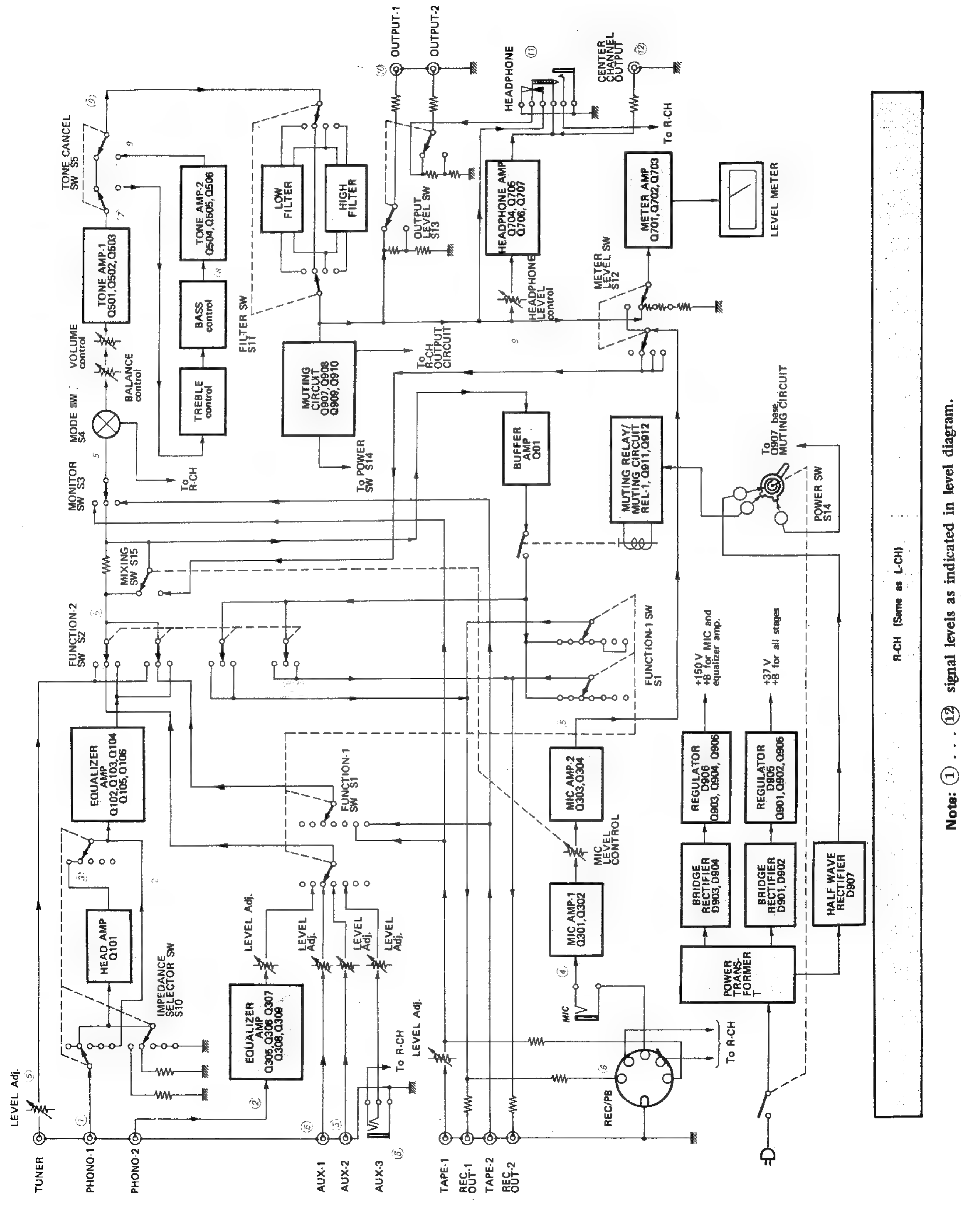
Stage/Control	*Function*
Driver Q705	Though this stage is a conventional flat amplifier, it determines the output voltage swings because the following stage is basically in the emitter-follower configuration. The ac load resistor for this stage is R718 in the collector circuit.
Power amplifiers (complementary stage) Q706, Q707	These transistors operate as emitter-followers to provide the current swings required and also perform the necessary phase inversion to drive the load in push-pull. Phase inversion is performed by using PNP and NPN type transistors. Q706 supplies power during the positive-going half cycle, while Q707 supplies power during the negative-going half cycle. The output is fed to the HEADPHONE jack through coupling capacitor C711.
CENTER CHANNEL OUTPUT jack	It also supplied to the CENTER CHANNEL output jack through R729 for use in center-woofer systems. Note that the left- and right-channel signals are mixed at this jack.
Muting circuit Q907, Q908 Q909, Q910	This muting circuit prevents the loud "pop" (due to initial current flow) or click noises from occurring just after turning the power switch to ON. These transients might damage a delicate high-fidelity speaker system. The base of Q909 (Q910) is connected to the collector circuit of Q908 through R914 (R913), while the base of Q908 is connected to an RC network (R910, C902) having a long time constant. Negative bias voltage is produced by D907 and C903, and then fed to the base circuit of Q909 (Q910) through R912. This effectively mutes the input signals up to 20V peak-to-peak. When you first turn ON the power switch, Q908 remains off due to the long time constant of the as-

Stage/Control	*Function*
	sociated bias circuit, while Q909 (Q910) is forward biased by R911. As a result, Q909 (Q910) is ON, shorting the output circuit to ground, and effectively muting the output signals. As Q908 is gradually turned ON due to the slowly-increasing base current flow, Q908 conducts and cuts off Q909 (Q910), removing the muting. Q907 is employed to discharge C902 quickly when power switch is turned off, preparing it for the next muting operation.
REC OUT Muting circuit Q911, Q912	This circuit is employed to mute the REC OUT signals by means of relay REL-1, preventing the loud "pop" or click noises just after turning the power switch to ON. The base of Q911 is connected to the collector circuit of Q912, while the base of Q912 is connected to an RC network (R903, C901) having a long time constant. When you first turn ON the power switch, Q912 remains off due to the long time constant of the associated bias circuit. This keeps open the muting relay, disconnecting the buffer amplifier's (Q01) output from the REC OUT signal path. As Q912 is gradually turned ON due to the slowly-increasing base current flow, Q912 conducts and turns on Q911, energizing the muting relay to deliver the buffer amplifier's output to the REC OUT terminal.

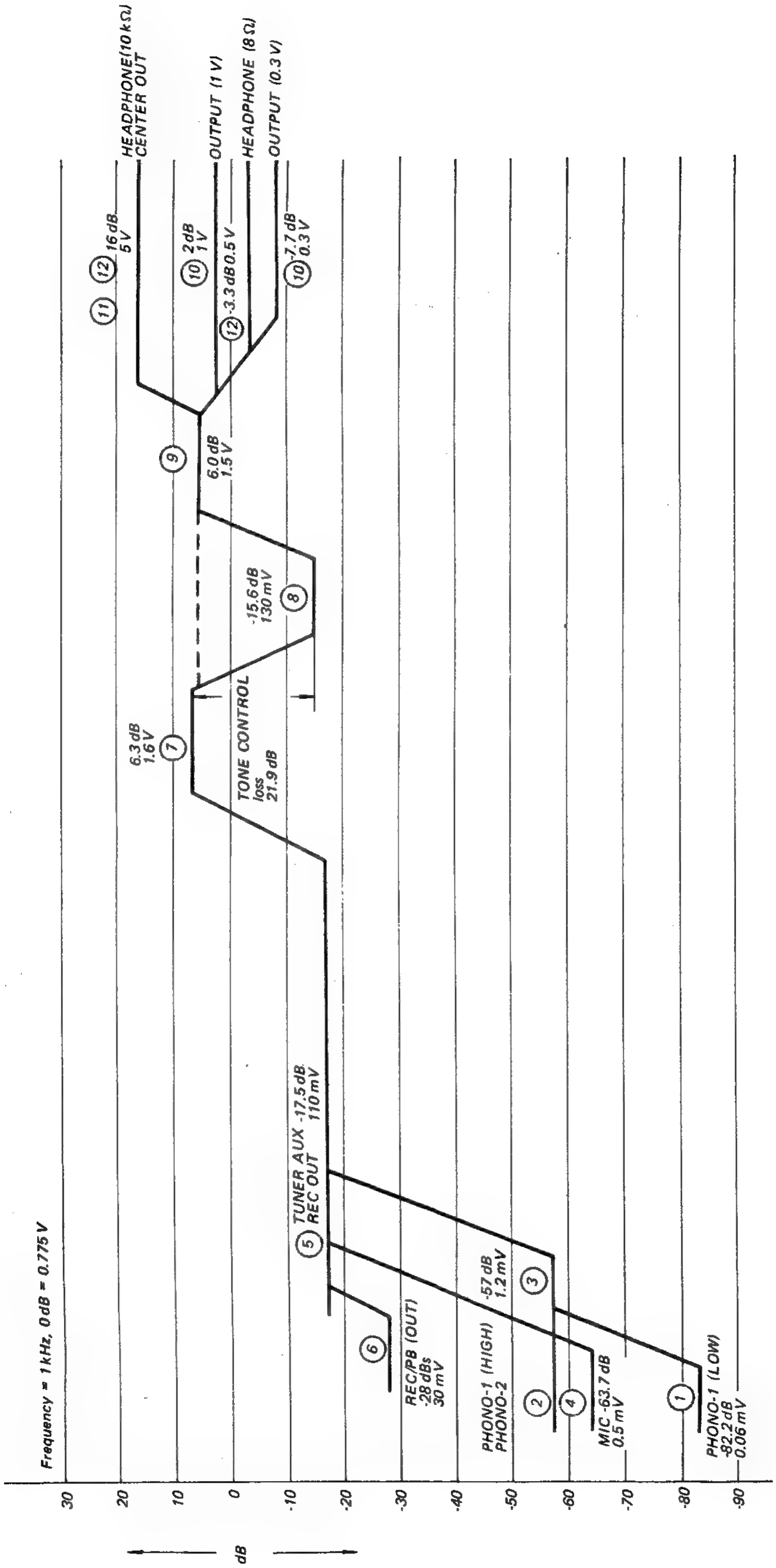
Power Supply Section

Stage/Control	*Function*
	Two independent regulated power supplies are employed to obtain stable operation. One is a low-voltage supply delivering 37 volts dc, and the other is a high voltage supply delivering 150 volts dc. As both power supplies have the same configuration, only the low-voltage regulator circuit is described here. The high-voltage supply is identical except for reference numbers.
Voltage regulator Q901, Q902, Q903 (Q904, Q905, Q906)	Dc output from bridge rectifier D901 and D902 (D903 and D904) is filtered by C18 (C17) and applied to series regulator Q901 and Q902 (Q904 and Q905). Q903 (Q906) compares a sample of the output voltage picked off across power supply adjust control R926 (R920), with reference voltage supplied by zener diode D905 (D906). A change in the output voltage is detected at the base of Q903 (Q906) and therefore alters its collector voltage. Since the collector of Q903 is directly coupled to the base of Q902 (Q905), the change in output voltage alters the conduction of Q901 and Q902 (Q904 and Q905) by the amount necessary to maintain the output voltage constant. An increase in output voltage causes an increase in the impedance (decrease in conduction) of Q901 and Q902 (Q904 and Q905), and vice-versa. The dc output voltage supplied to the preamplifier section is therefore extremely stable.

1-3. BLOCK DIAGRAM



1-4. LEVEL DIAGRAM



SECTION 2
DISASSEMBLY AND REPLACEMENT PROCEDURES

WARNING

Unplug the ac power cord before starting any disassembly or replacement procedures.

2-1. TOOLS REQUIRED

The following tools are required to perform disassembly and replacement procedures on the TA-2000F.

1. Screwdriver, Phillips-head
2. Screwdriver, 3 mm ($1/8$") blade
3. Pliers, long-nose
4. Diagonal cutters
5. Wrench, adjustable
6. Tweezers
7. Soldering iron, 40 to 50 watts
8. Soldering iron, solder-sucker tip
9. Solder, rosin core

2-2. HARDWARE IDENTIFICATION GUIDE

The following chart will help you to decipher the hardware codes given in this service manual.

Note: All screws in this set are manufactured to the specifications of the International Organization for Standardization (ISO). This means that the new and old screws are not interchangeable because ISO screws have a different number of threads per mm compared to the old ones. The ISO screws have an identification mark on their heads as shown in Fig. 2-1.

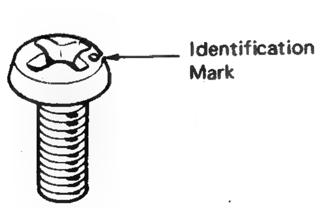


Fig. 2-1. ISO screw

— Hardware Nomenclature —

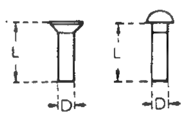
P	–	Pan Head Screw
PS	–	Pan Head Screw with Spring Washer
K	–	Flat Countersunk Head Screw
B	–	Binding Head Screw
RK	–	Oval Countersunk Head Screw
T	–	Truss Head Screw
R	–	Round Head Screw
F	–	Flat Fillister Head Screw
SC	–	Set Screw
E	–	Retaining Ring (E Washer)

W	–	Washer
SW	–	Spring Washer
LW	–	Lock Washer
N	–	Nut

– Example –

⊕ P 3x10

- Type of Slot (⊕)
- Type of Head (P)
- Diameter in mm (D) (3)
- Length in mm (L) (10)



2-3. TOP COVER AND FRONT PANEL REMOVAL

1. Remove the two machine screws at each side of the case and lift off the top cover.
2. Remove all control knobs and levers. The knobs can be removed by loosening the slotted set screws and pulling the knobs straight out. The levers are simply pulled off.
3. Remove the four self-tapping screws (⊕ B 3x6) securing the front subchassis's top cover and lift off it. See Fig. 2-2.
4. Remove the three screws (⊕PS 4x5) behind the top edge of the front subchassis as shown in Fig. 2-3.
5. Remove the three self-tapping screws (⊕ B 3x6) at the front bottom of the chassis as shown in Fig. 2-4. This frees the front panel.

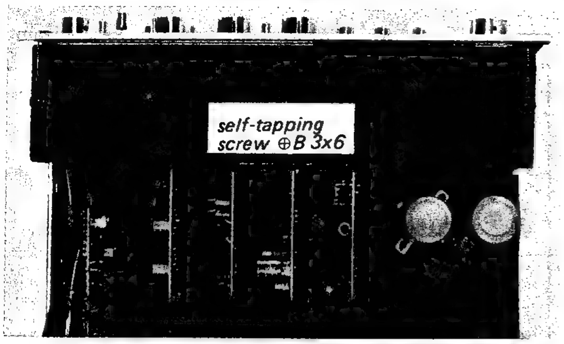


Fig. 2-2. Front subchassis's top cover removal

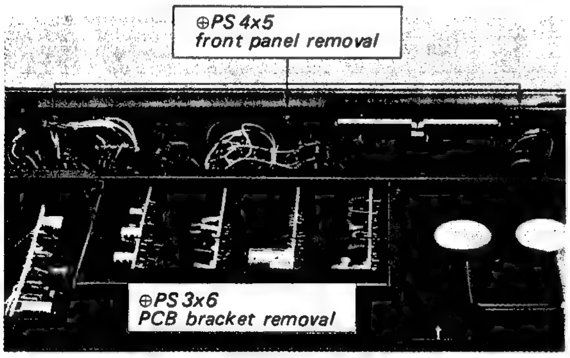


Fig. 2-3. Front panel and PCB bracket removal

2-4. FRONT SUBCHASSIS REMOVAL

The front subchassis is the vertical member on which the controls, switches, and the pilot lamps are attached.

1. Remove the top cover and front panel as described in Procedure 2-3.

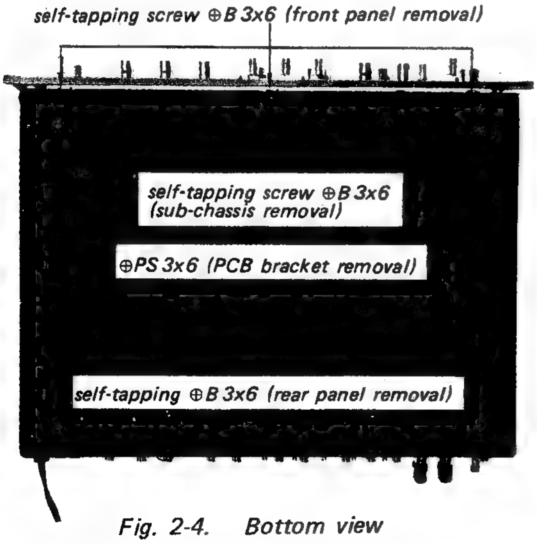


Fig. 2-4. Bottom view

2. Remove the two self-tapping screws (⊕ B 3x6) at each side of the chassis (see Fig. 2-5) and two self-tapping screws (⊕ B 3x6) at the front bottom of the chassis as shown in Fig. 2-4. This frees front subchassis.

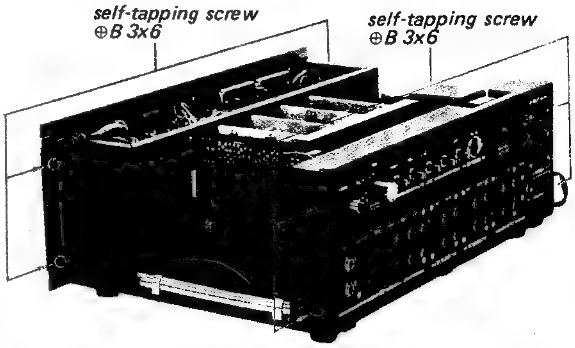


Fig. 2-5. Front subchassis and rear panel removal

2-5. LEVEL METER AND METER LAMP REPLACEMENT

1. Remove the front subchassis as described in Procedure 2-4.
2. Remove the four screws (⊕ PS 3x6) securing the meter bracket to the front subchassis as shown in Fig. 2-6. This frees the meter bracket.
3. Remove the defective level meter or meter lamp by loosening the hex nut or prying out the defective lamp, and then install the new one.

2-6. PC BOARD REMOVAL

Prepare for removing or replacing any of the PC boards by removing the top cover as described in Procedure 2-3.

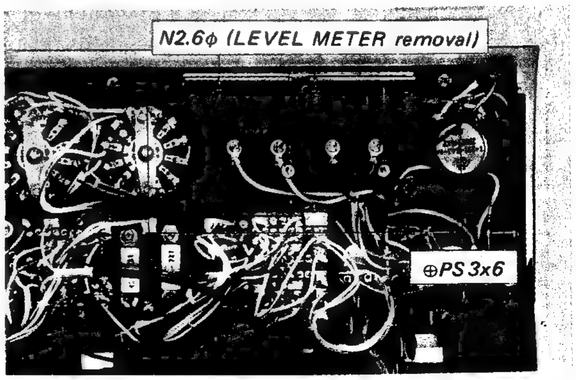


Fig. 2-6. Meter bracket removal

PHONO-1 Equalizer Amplifier/Head Amplifier Board

1. Remove the IMPEDANCE SELECTOR knob by loosening the set screw.
2. Remove the hex nut securing the IMPEDANCE SELECTOR switch to the rear panel.
3. Remove the three screws (⊕ PS 3x6) securing the PCB bracket to the rear panel cover. This frees the PCB.

Plug-in Type PCB

1. Remove the two screws (⊕ PS 3x6) securing the PCB bracket to the PCB mounting bracket as shown in Fig. 2-3.
2. Remove the two screws (⊕ PS 3x6) securing the PCB mounting bracket to the chassis from the bottom as shown in Fig. 2-4.
   This frees the bracket, and now the PCB's can be simply pulled out.

REC OUT Buffer/High and Low Filter Component/ Turnover Frequency Changeover Component Board

1. Remove the front subchassis as described in Procedure 2-4.
2. Remove the two screws (⊕ PSW 3x6) securing the PCB to the front subchassis as shown in Fig. 2-7.

OUTPUT LEVEL Changeover Switch Board

1. Remove the rear panel as described in Procedure 2-7.
2. Remove the two screws (⊕ B 2.6x4) securing the OUTPUT LEVEL changeover switch to the rear panel as shown in Fig. 2-8.

Note: This board is directly soldered to the OUTPUT LEVEL changeover switch.

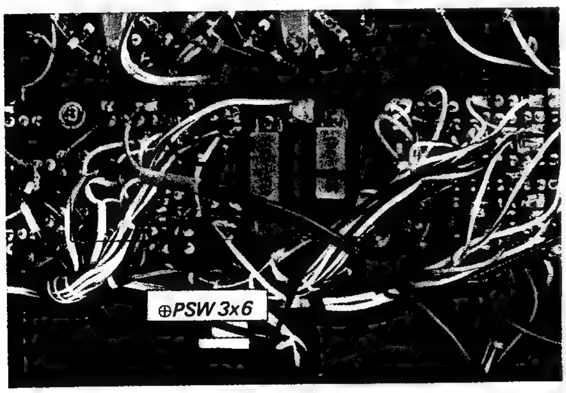


Fig. 2-7. PC board removal

2-7. REAR PANEL REMOVAL

1. Remove the PHONO-1 Equalizer Amplifier/ Head Amplifier Board as described in Procedure 2-6.
2. Remove the two self-tapping screws (⊕ B 3x6) at each side of the rear panel as shown in Fig. 2-5.
3. Remove the two self-tapping screws (⊕ B 3x6) at rear edge of the bottom as shown in Fig. 2-4. This frees the rear panel.

2-8. CONTROL AND SWITCH REPLACEMENT

Prepare for replacing any of the controls or switches by removing the front panel and front subchassis or rear panel as described in Procedures 2-4 and 2-7.

POWER, FUNCTION-2, MONITOR, TURNOVER FREQ. and TONE CANCEL Switches

1. Remove the two screws securing switches to the front subchassis as shown in Fig. 2-9.
2. Unsolder the lead wires from the defective switch, and then install the replacement switch. Note that the PCB mounted at the back of the front subchassis should be removed when replacing the TURNOVER FREQ. or TONE CANCEL switch.

Fig. 2-8. Rear view

FUNCTION-1, MODE, FILTER, METER LEVEL Switches and VOLUME, HEADPHONE LEVEL, BALANCE, BASS, TREBLE and MIC LEVEL Controls

1. Remove the hex nut that secures the defective switch or control to the front subchassis as shown in Fig. 2-9.
2. Unsolder the lead wires from the defective switch or control and then install the new one.

HEADPHONE, AUX-3 jacks

1. Remove the two screws (⊕ PS 3x6) securing the jack escutcheon to the front subchassis.
2. Unsolder the lead wires from the defective jack, and then install the new one.

LEVEL ADJUST Controls and MIC Jack

1. Remove the ornamental nut securing the controls or jack to the rear panel. Use pliers covered with a soft cloth. Take care not to mar the rear panel.
2. Unsolder the lead wires from the defective control or jack, and then install the new one.

IMPEDANCE SELECTOR Switch

1. Remove the PHONO-1 Equalizer Amplifier/ Head Amplifier Board as described in Procedure 2-6.
2. With a soldering-iron having a solder-sucking tip, clean the solder from each lug of the defective switch and the printed board as shown in Fig. 2-10. This frees the switch.
3. Install the replacement switch.

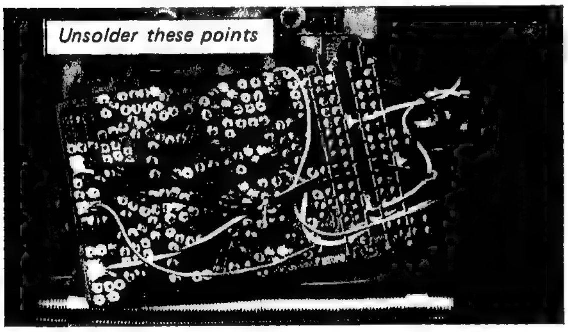


Fig. 2-10. IMPEDANCE selector switch removal

2-9. REPLACEMENT OF COMPONENTS SECURED TO THE REAR PANEL BY RIVETS

1. Remove the rear panel as described in Procedure 2-7.
2. Bore out the rivets using a drill bit slightly larger in diameter than the rivet. See Fig. 2-11.
3. Punch out the remainder of the rivet with a nail set or prick punch.
4. Remove the defective component, and then install a new one.
5. Secure the new component with a suitable screw and nut, or a repair rivet screw (part number 3-701-402).

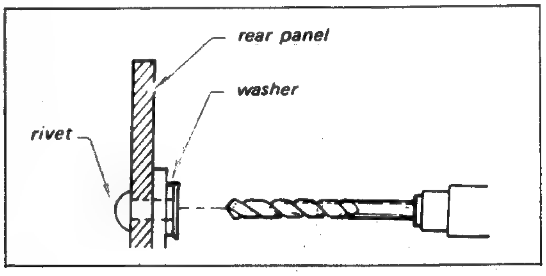


Fig. 2-11. Rivet replacement

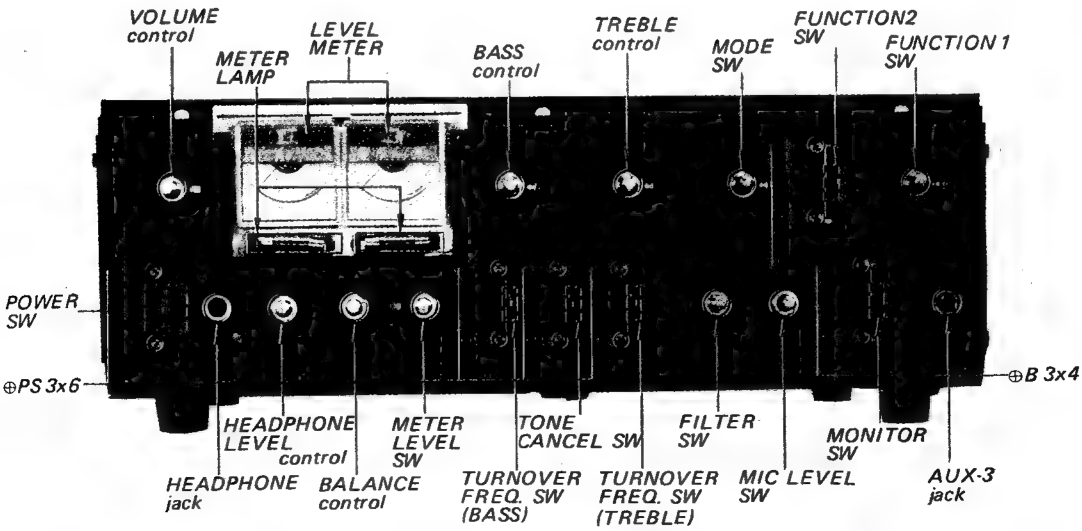
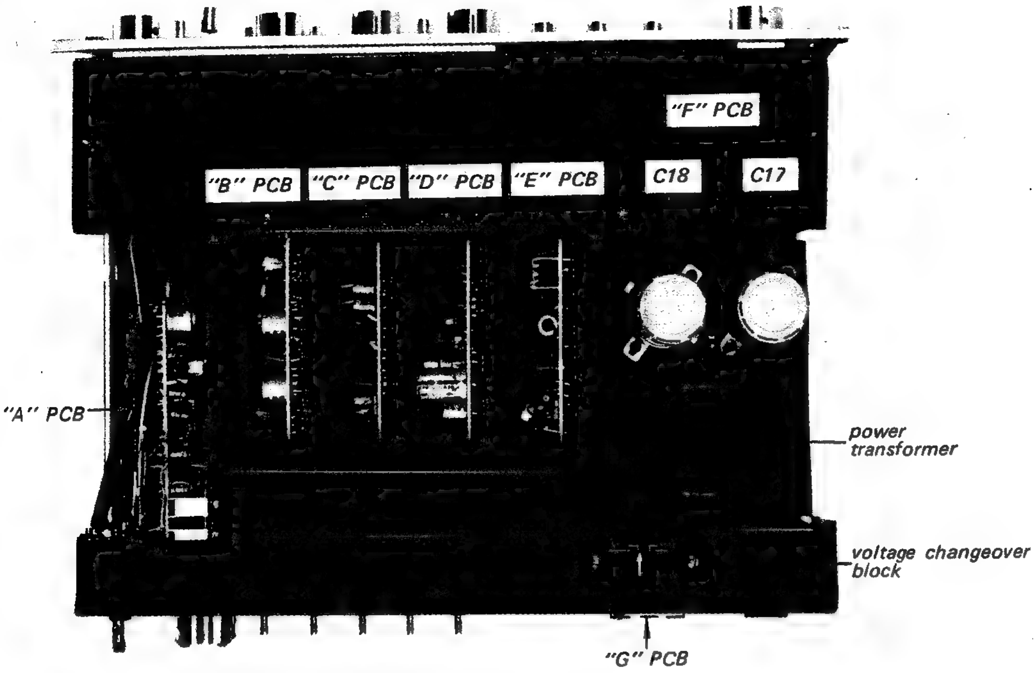


Fig. 2-9. Control and switch replacement

2-10. CHASSIS LAYOUT



Note:

"A" PCB: PHONO-1 Equalizer Amplifier/Head Amplifier Circuit Board

"B" PCB: MIC Amplifier/PHONO-2 Equalizer Amplifier Circuit Board

"C" PCB: Flat Amplifier-1/Flat Amplifier-2 Circuit Board

"D" PCB: Meter Amplifier/Headphone Amplifier Circuit Board

"E" PCB: Muting/Power Supply Circuit Board

"F" PCB: REC OUT Buffer/High and Low Filter Component/Turnover Frequency Changeover Component Circuit Board

"G" PCB: OUTPUT LEVEL Changeover Switch Circuit Board

SECTION 3
ALIGNMENT AND ADJUSTMENT PROCEDURES

3-1. TEST EQUIPMENT REQUIRED

1. Audio Oscillator

   Frequency range .... 10 Hz to 100 kHz
   Distortion .... 0.03% or less at 1 kHz

2. Distortion Meter

   Capable of measuring of 0.015% distortion or less at 1 kHz
   Frequency range .... 20 Hz to 100 kHz
   Input impedance............ 1 megohm or more

3. Ac VTVM

   Capable of measuring rms voltage of 100 mV or less with a frequency range from 10 Hz to 100 kHz.
   Input impedance .... 500k ohms or more

4. Attenuator

   Capable of attenuating signals 60 dB or more.
   Characteristic impedance .... 600 ohms unbalanced

5. Oscilloscope

   Bandwidth .... 1 MHz or more

6. Dc Voltmeter

   Capable of measuring dc voltage of 150 V and 50 V or less.

7. Resistors 600 ohm (¼ W)
   3 ohm (¼ W)

Note: 1. When measuring the sensitivity of the PHONO-1 LOW LEVEL input, insert a 46 dB pad (shown in Fig. 3-1.) between the attenuator and input terminal. The input sensitivity may be regarded as the reading on the attenuator plus the pad loss.
2. 0 dB = 0.775 V (r.m.s.)

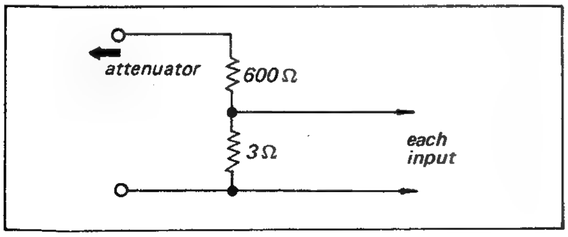


Fig. 3-1. 46 dB pad

3-2. POWER SUPPLY VOLTAGE ADJUSTMENT

Check the power supply voltages before starting any measurements and readjust them if necessary.

Preparation

1. Remove the top cover as described in Procedure 2-3 and connect the dc voltmeter to the test points as shown in Fig. 3-2.

Procedure

1. Set the variable transformer for minimum output.
2. Turn the POWER switch to ON, and then increase the line voltage up to the rated value.
3. Adjust semifixed resistor R920 (high-voltage regulator) and R926 (low-voltage regulator) to obtain 150 V and 37 V readings respectively on the meter.

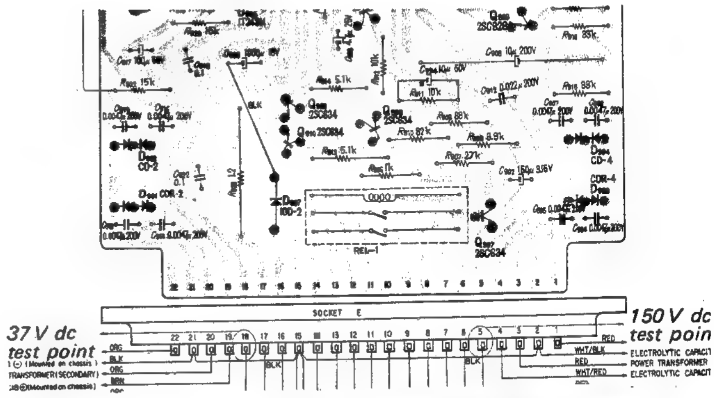


Fig. 3-2. Dc voltmeter connections

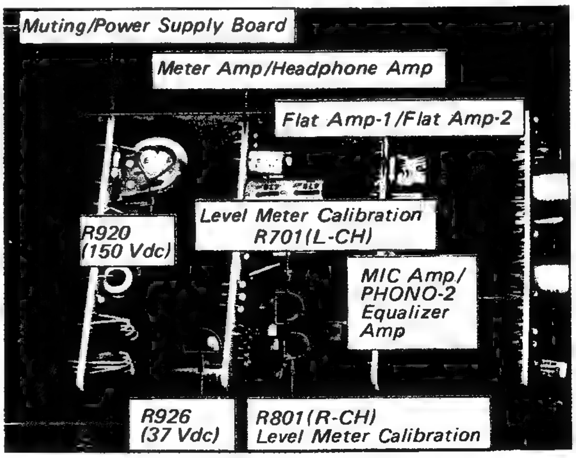


Fig. 3-3. Parts location

3-3. OVERALL CHECK PREPARATION

Unless otherwise specified, set all controls and switches as follows to prepare for the following checks:

VOLUME control	maximum position
MODE switch	STEREO
MONITOR switch	SOURCE
MIC LEVEL control	MIXING OFF
FILTER switch	OFF
TREBLE control	0 (dB)
BASS control	0 (dB)
TONE switch	CANCEL
TREBLE TURNOVER FREQ. switch	2.5 kHz
BASS TURNOVER FREQ. switch	500 Hz
METER LEVEL switch	0 (dB)
HEADPHONE LEVEL control	minimum level
BALANCE control	mid position
LEVEL ADJUST control .. (rear panel)	maximum level
OUTPUT LEVEL switch ... (rear panel)	1 V
IMPEDANCE SELECTOR switch ......:. (rear panel)	47 k

3-4. SENSITIVITY MEASUREMENT

Preparation

1. Set all the controls as described in Procedure 3-3.
2. Set the FUNCTION-1, IMPEDANCE SELECTOR, and FUNCTION-2 switches to the position where the measurement should be performed.
3. Set the BALANCE control to fully counter-clockwise (left-channel measurement) or fully clockwise (right-channel measurement) position.

Procedure – Perform this for each input

1. With the equipment connected as shown in Fig. 3-4, feed a 1 kHz signal to the input jack. Adjust the attenuator to obtain a 1 volt reading on the ac VTVM. Note that the audio oscillator's output should always be kept at 0.775 volts (0 dB).
2. The reading of the attenuator represents the input sensitivity and should within the limits given in Table 3-1.

TABLE 3-1. INPUT SENSITIVITY

INPUTS	SPECIFIED SENSITIVITY AT 1 kHz
PHONO-1 (HIGH LEVEL) *(LOW LEVEL)	-57 ±1 dB -82.2 ±1.5 dB
PHONO-2	-57 ±1 dB
MIC	-63.7 ±1.5 dB
TUNER, AUX-1, -2, -3	-17.5 ±0.5 dB

* The PHONO-1 IMPEDANCE SELECTOR switch should be set to 30 Ω and an additional attenuator pad (See Fig. 3-1.) used between the main attenuator and input jack.

3-5. LEVEL METER (VU meter) CALIBRATION

Preparation

1. Set the FUNCTION-2 switch to TUNER.
2. Set the BALANCE control fully counterclockwise (left-channel calibration) or fully clockwise (right-channel calibration).
3. Set the METER LEVEL switch to 0 dB.

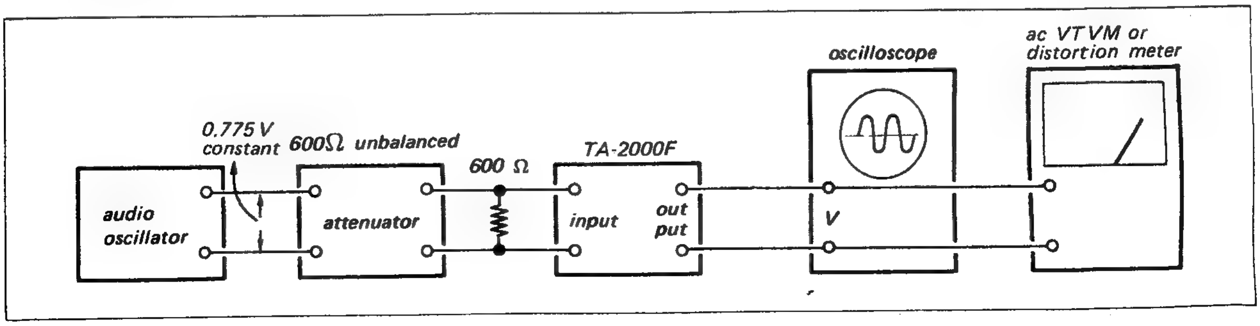


Fig. 3-4. Level check test setup

Procedure

1. With the equipment connected as shown in Fig. 3-4, feed a 1 kHz to the TUNER input jack. Adjust the attenuator to obtain a 1 volt reading on the ac VTVM.
2. Turn the semifixed resistor R701 (R801), see Fig. 3-3, mounted on the Meter Amplifier/ Headphone Amplifier board to obtain a 0 reading on the level meter.
3. Decrease the input signal level 10 dB (20 dB), and then set the METER LEVEL switch to -10 dB (-20 dB) position.
4. Confirm that the reading on the level meter is 0 ± 0.5 VU.
5. Confirm that the reading of the meter changes with variations in attenuator settings.

3-6. RATED OUTPUT MEASUREMENT

Preparation

1. Set the FUNCTION-2 switch to TUNER.
2. Set the BALANCE control fully counterclock-wise (left-channel calibration) or fully clock-wise (right-channel calibration).
3. Set the OUTPUT LEVEL switch to 1 V.
4. Set the HEADPHONE LEVEL control to maximum level position.

Procedure

1. With the equipment connected as shown in Fig. 3-4, feed a 1 kHz to the TUNER input jack. Adjust the attenuator to obtain a 1 volt reading on the ac VTVM.
2. Each output level should be within the limits given in Table 3-2.

TABLE 3-2. OUTPUT LEVEL

Outputs	Output Level
CENTER OUTPUT	16.0 ±1 dB
HEADPHONE OUT (open)	16.0 ±1 dB
REC OUT	-17.5 ±1 dB
REC/PB OUT 1 or 4 to ground see Fig. 3-5.	-32 ±3 dB

3-7. HARMONIC-DISTORTION MEASUREMENT

Preparation

Same as described in Procedure 3-3, except the TONE switch should be set to ON.

Procedure

1. With the equipment connected as shown in Fig. 3-4, feed in the signal specified in Table 3-3 and then adjust the VOLUME control to obtain a 1 volt (r.m.s.) output.
2. Measure the harmonic distortion. The harmonic distortion should be within the limits given in Table 3-3.

TABLE 3-3. HARMONIC DISTORTION

Inputs	Input Signal Level and Freq.	Harmonic Distortion
PHONO-1 (HIGH LEVEL) or PHONO-2	-18 dB, 1 kHz -8 dB, 1 kHz	0.05% or less 0.1% or less (at 3 vols output)
*MIC	3 dB, 1 kHz	0.7% or less (at 3 vols output)
TUNER, AUX-1, 2, 3	-17.5 ±0.5 dB, 1 kHz	0.03% or less

***Note:** In this measurement, adjust the output level by means of the MIC LEVEL control.

3-8. FREQUENCY RESPONSE MEASUREMENT

Preparation

Same as Procedure 3-4.

Procedure – Perform this for each input.

1. With the equipment connected as shown in Fig. 3-4, feed a 1 kHz signal to the input jack. Vary the attenuator to obtain a 1 volt reading on the ac VTVM.
2. Check the frequency response by varying the input signal frequency while keeping the oscillator's output constant. Frequency response should be within the limits as given in Table 3-4.

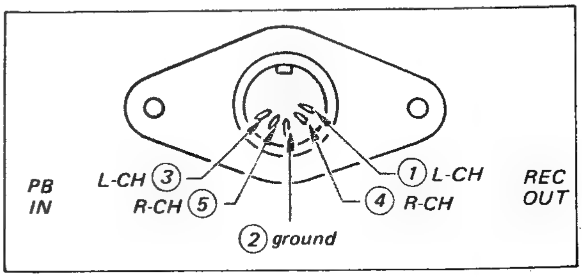


Fig. 3-5. REC/PB (DIN) connector

TABLE 3-4. FREQUENCY RESPONSE

Inputs	*Specified Frequency Response
TUNER	$\pm^{0}_{2}$ dB at 10 Hz $\pm^{0}_{2}$ dB at 100 kHz
PHONO-1 (HIGH LEVEL) (47 k) or (LOW LEVEL) (30 ohm)	13.1 ±0.5 dB at 100 Hz -13.7 ±0.5 dB at 10 kHz
MIC (MIC LEVEL control: maximum)	$\pm^{0}_{2}$ dB at 30 Hz $\pm^{0}_{2}$ dB at 30 kHz
TUNER	CENTER OUTPUT $\pm^{0}_{2}$ dB at 20 Hz $\pm^{0}_{2}$ dB at 20 kHz

* referred to 1 kHz 1 volt output

3-9. NOISE LEVEL MEASUREMENT

Preparation

1. Same as described in Procedure 3-3 except set the FILTER switch to LOW and the TONE switch to ON.
2. Turn the VOLUME control fully clockwise.

Procedure

1. With the equipment connected as shown in Fig. 3-6, measure the output noise level at each FUNCTION switch position, with the corresponding input terminals shorted.

TABLE 3-5. NOISE LEVEL SPECIFICATIONS

Inputs	Noise Level
TUNER	-70 dB or less
PHONO-1 (HIGH LEVEL) (47k ohm)	-57 dB or less
PHONO-1 (LOW LEVEL) (30 ohm)	-40 dB or less
PHONO-2	-57 dB or less
MIC	-35 dB or less

Note: The difference between left and right channel noise levels should be 4 dB or less. The average noise levels are given in Table 3-5.

3-10. TONE CONTROL CHECK

Preparation

1. Set all controls as described in Procedure 3-3, except set the TONE switch to ON.
2. Set the FUNCTION-2 switch to TUNER.

Procedure

1. With the equipment connected as shown in Fig. 3-4, feed a 1 kHz signal to the TUNER input jack. Vary the attenuator to obtain a 1 volt reading on the ac VTVM.
2. Check the frequency response by varying the BASS, TREBLE controls and the input signal frequency while keeping the oscillator's output constant. TONE control response should be as given in Table 3-6.

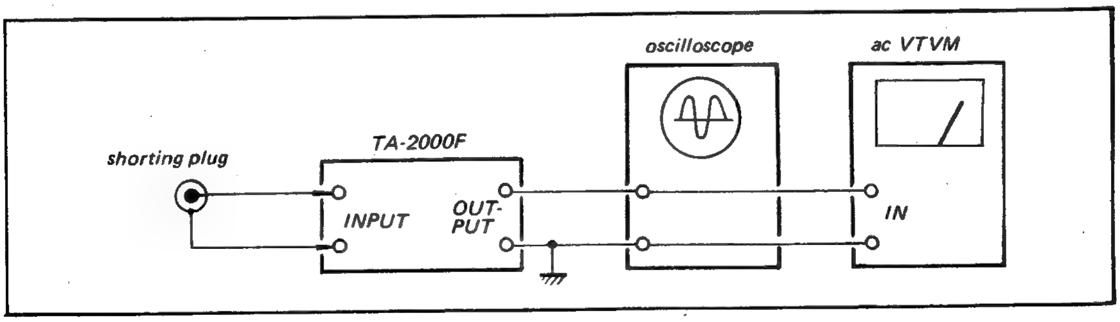


Fig. 3-6. Noise level check test setup

TABLE 3-6. TONE CONTROL CHECK

Inputs	Controls	Specified Frequency Response
TUNER	BASS (Turnover Freq. 500 Hz)	±10 dB* maximum, 2 dB step at 100 Hz
	TREBLE (Turnover Freq. 2.5 kHz)	±10 dB* maximum, 2 dB step at 10 kHz
Same as above	BASS (Turnover Freq. 250 Hz)	±10 dB* maximum, 2 dB step at 50 Hz
	TREBLE (Turnover Freq. 5 kHz)	±10 dB* maximum, 2 dB step at 20kHz

* referred to 1 volt at 1 kHz.

3-11. FILTER RESPONSE CHECK

Preparation

1. Set all controls as described in Procedure 3-3.
2. Set the FUNCTION-2 switch to TUNER.

Procedure

1. With the equipment connected as shown in Fig. 3-3, feed a 1 kHz signal to the TUNER input jack. Vary the attenuator to obtain a 1 volt reading on the ac VTVM.
2. Check the frequency response by operating the FILTER switch and varying the input signal frequency. Keep the oscillator's output constant. Filter response should be within the limits given in Table 3-7.

TABLE 3-7. FILTER RESPONSE CHECK

FILTER SW Position	Specified Frequency Response
LOW or BOTH	* -3 ± 1.5 dB at 50 Hz
HIGH or BOTH	* -3 ± 1 dB at 9 kHz

* referred to 1 kHz 1 volt output.

3-12. CROSSTALK MEASUREMENT

Preparation

1. Set all the controls as described in Procedure 3-3, except set the TONE switch to ON position.
2. Set the FUNCTION-2 switch to TUNER.

Procedure

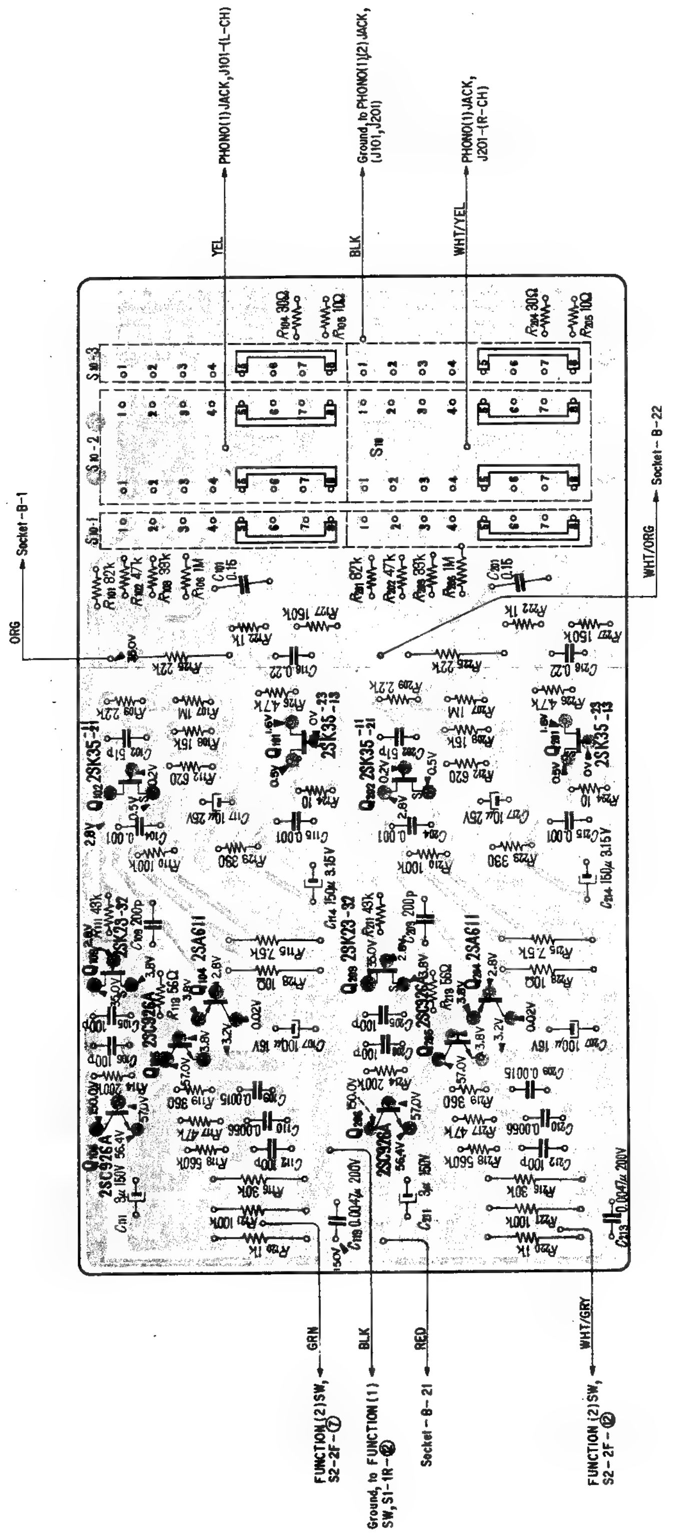
1. With equipment connected as shown in Fig. 3-3, feed a 1 kHz signal to the TUNER input jack (left channel). Vary the attenuator to obtain a 1 volt reading on the ac VTVM.
2. Switch the signal to the right-channel input jack while shorting the left-channel input.
3. Read the residual signal level in the left-channel output. The 1 volt output-level to residual-level ratio represents the channel crosstalk. The left-to-right and right-to-left crosstalk should be 60 dB or more.

MEMO

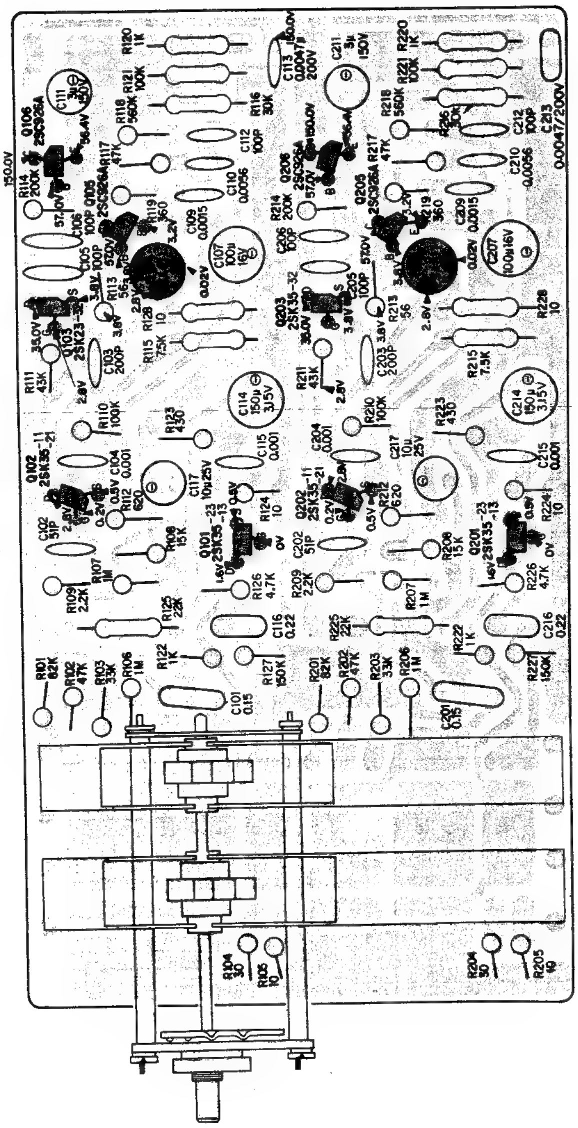
SECTIONS 4
DIAGRAMS

4-1. MOUNTING DIAGRAM – "A" PCB: PHONO-1 Equalizer Amplifier/Head Amplifier Board

– Conductor Side –

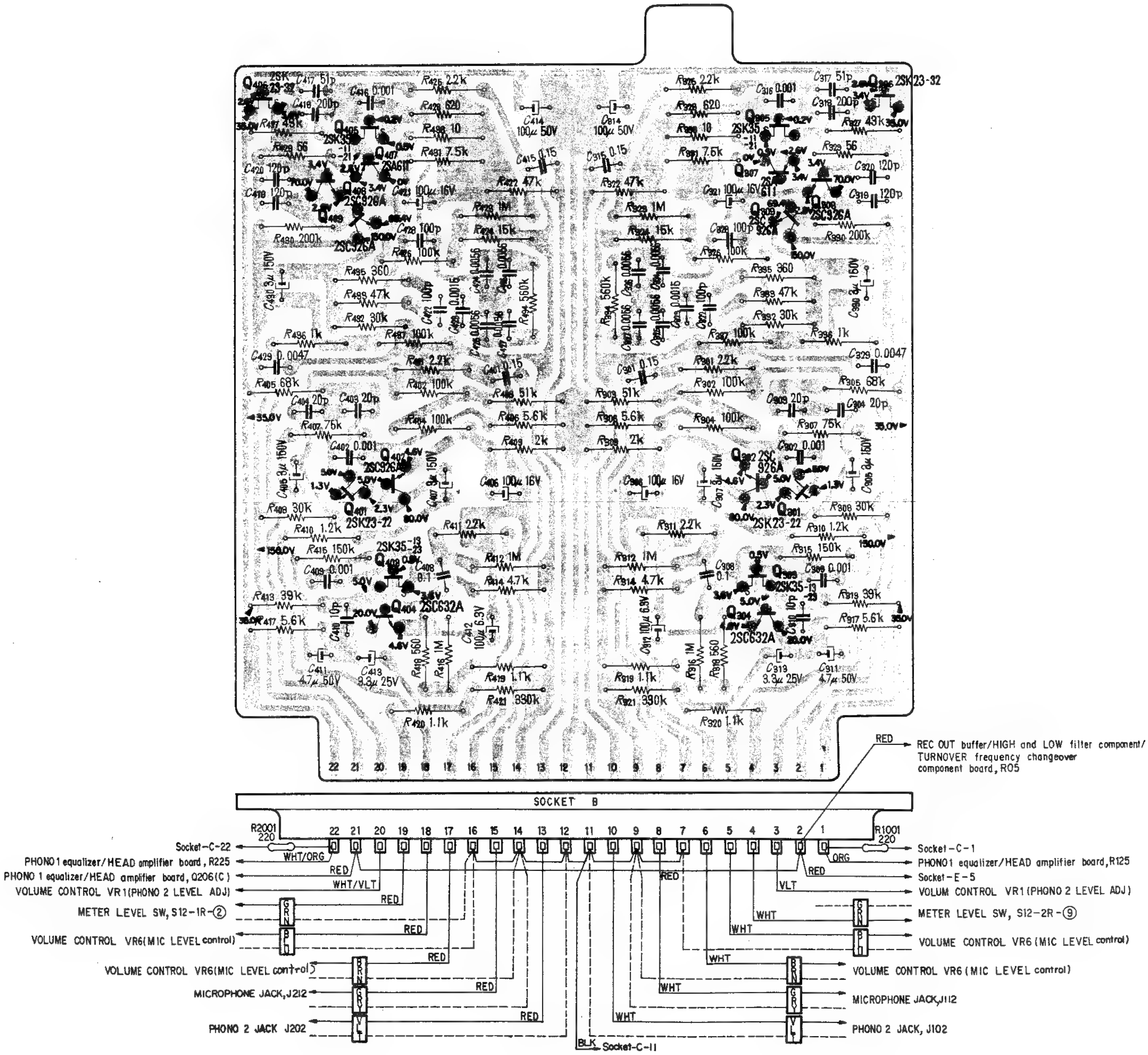


– Component Side –

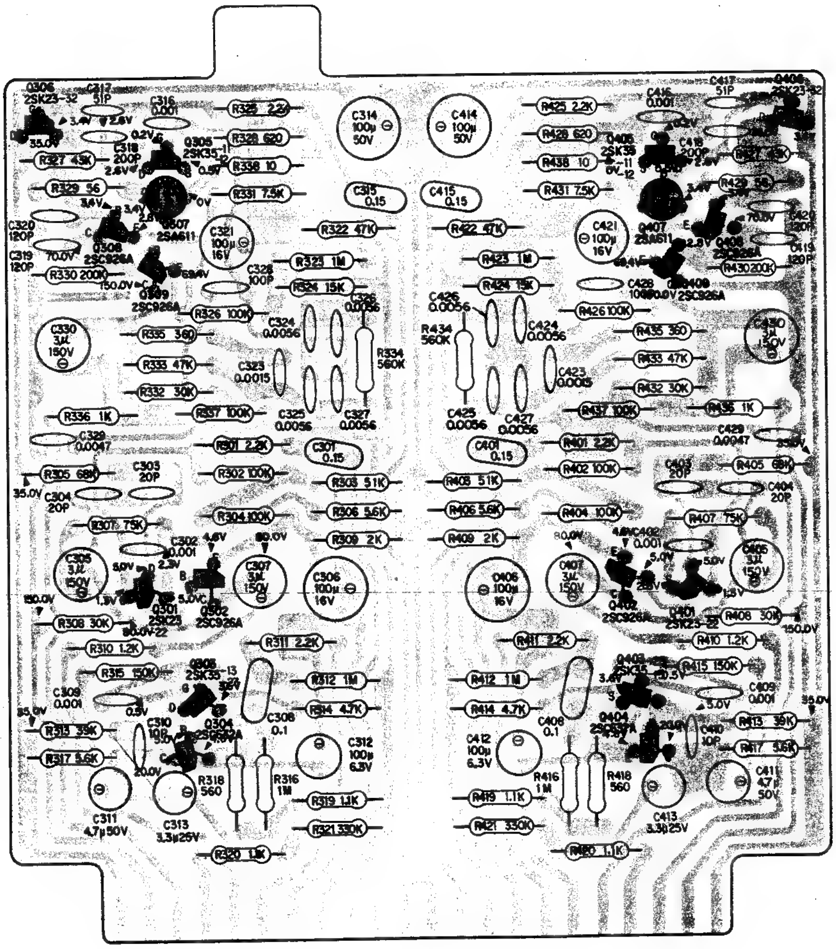


4-2. MOUNTING DIAGRAM – "B" PCB: MIC Amplifier/PHONO-2 Equalizer Amplifier Board

– Conductor Side –

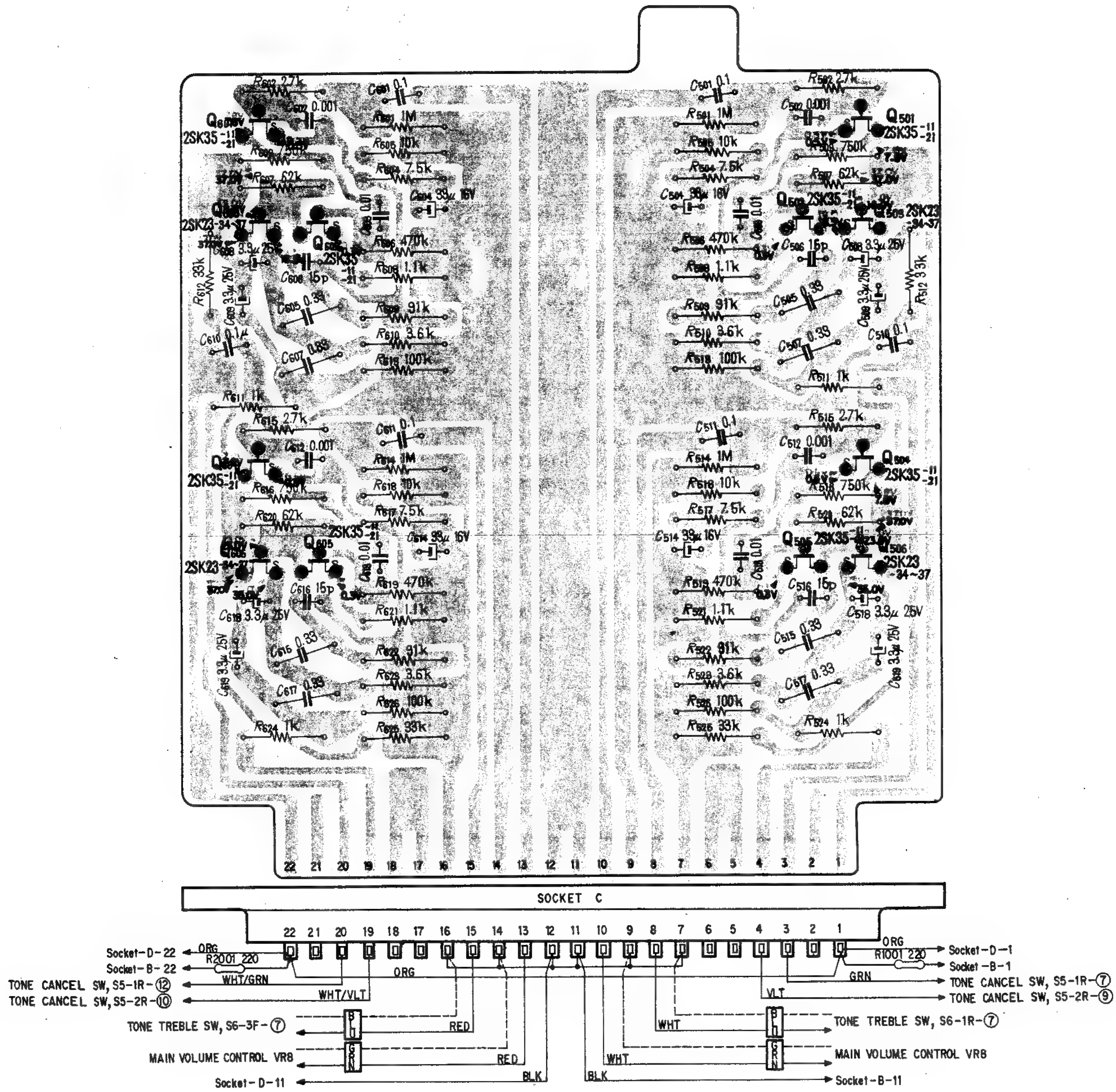


— Component Side —

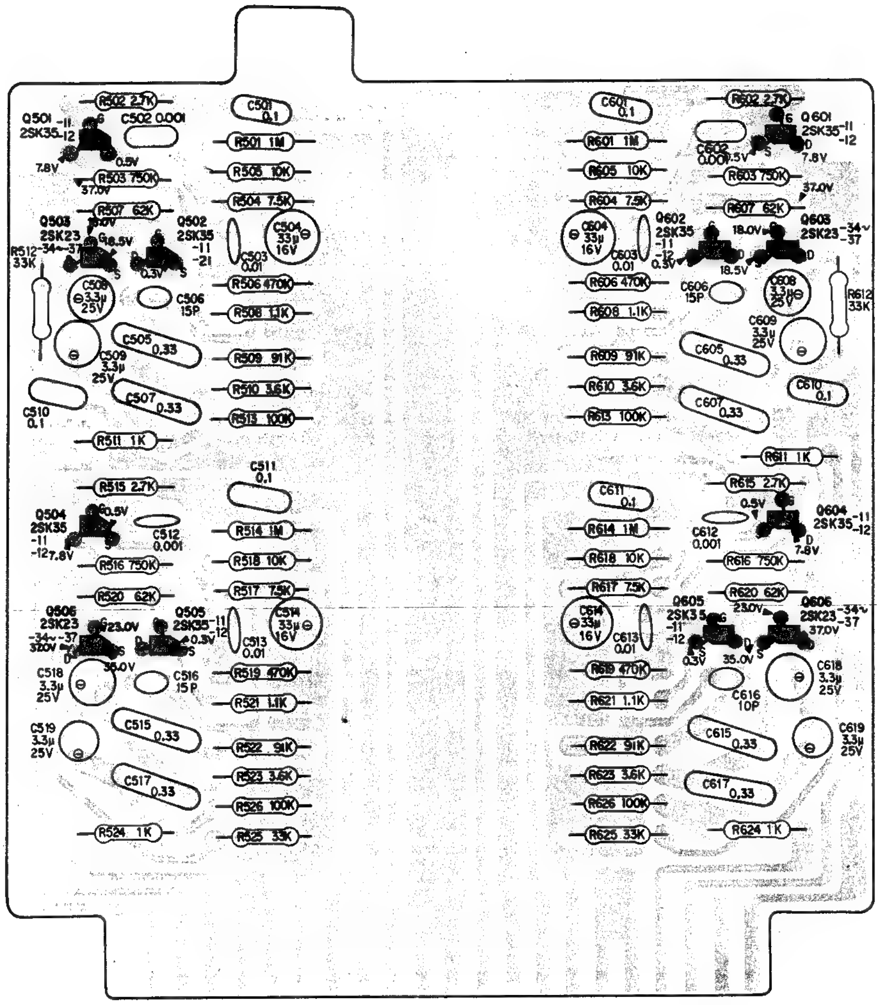


4-3. MOUNTING DIAGRAM – "C" PCB: Flat Amplifier-1/Flat Amplifier-2 Board

– Conductor Side –

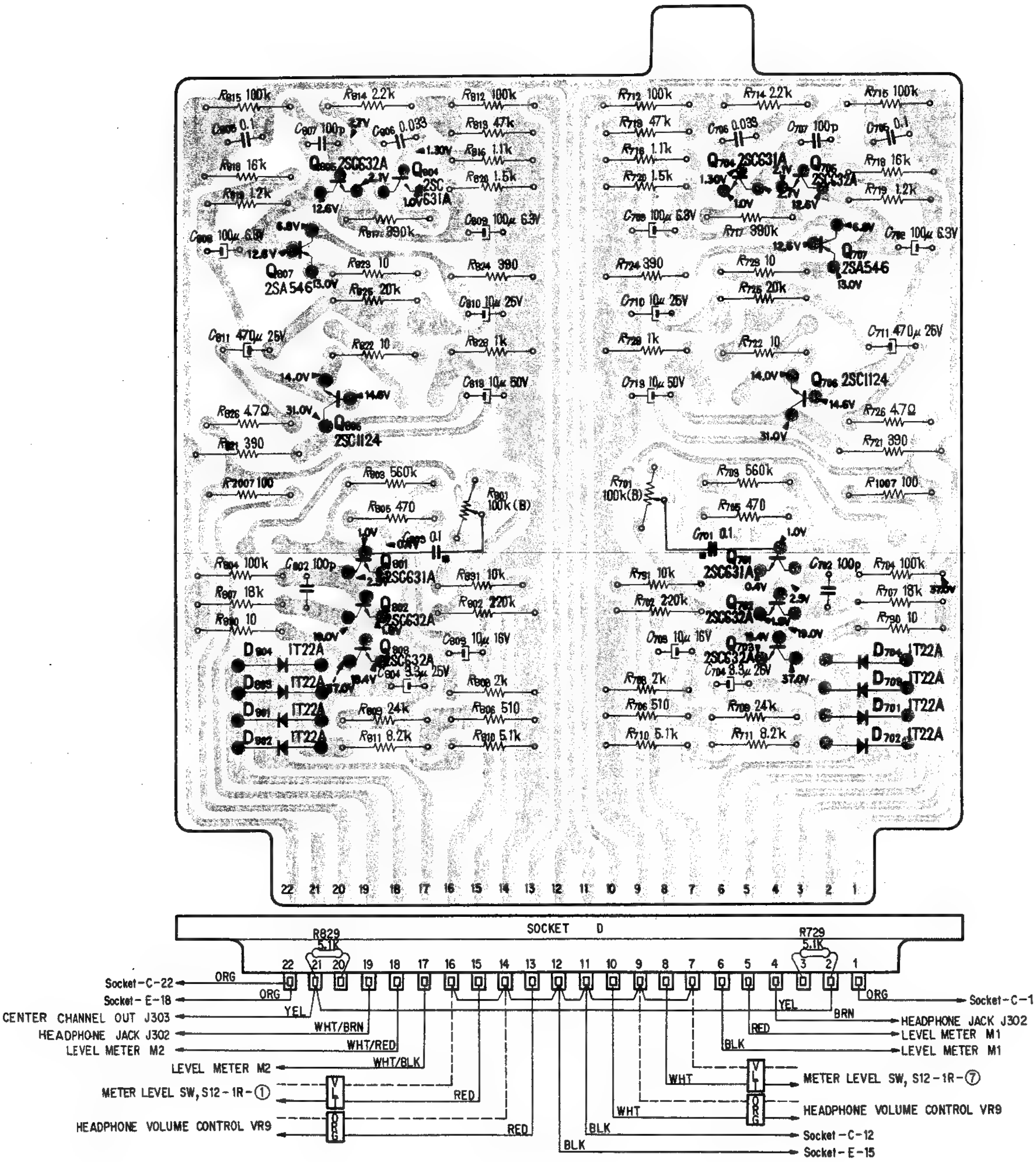


– Component Side –

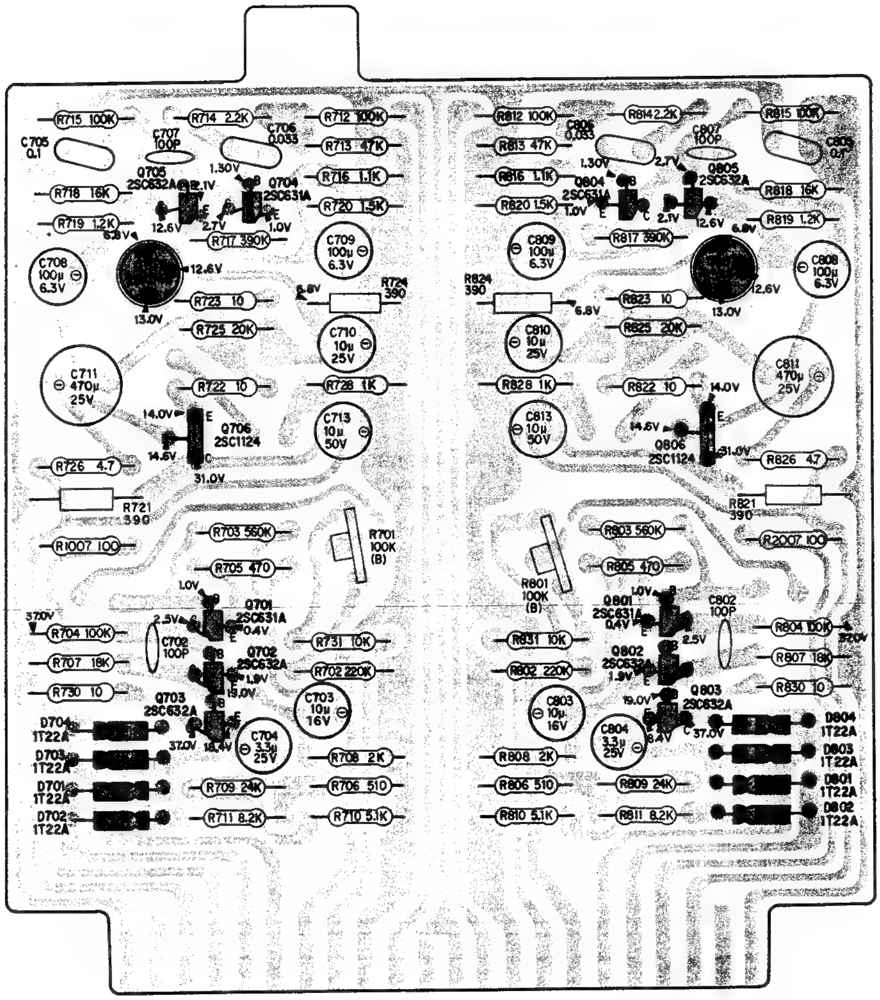


4-4. MOUNTING DIAGRAM – "D" PCB: Meter Amplifier/Headphone Amplifier Board

– Conductor Side –

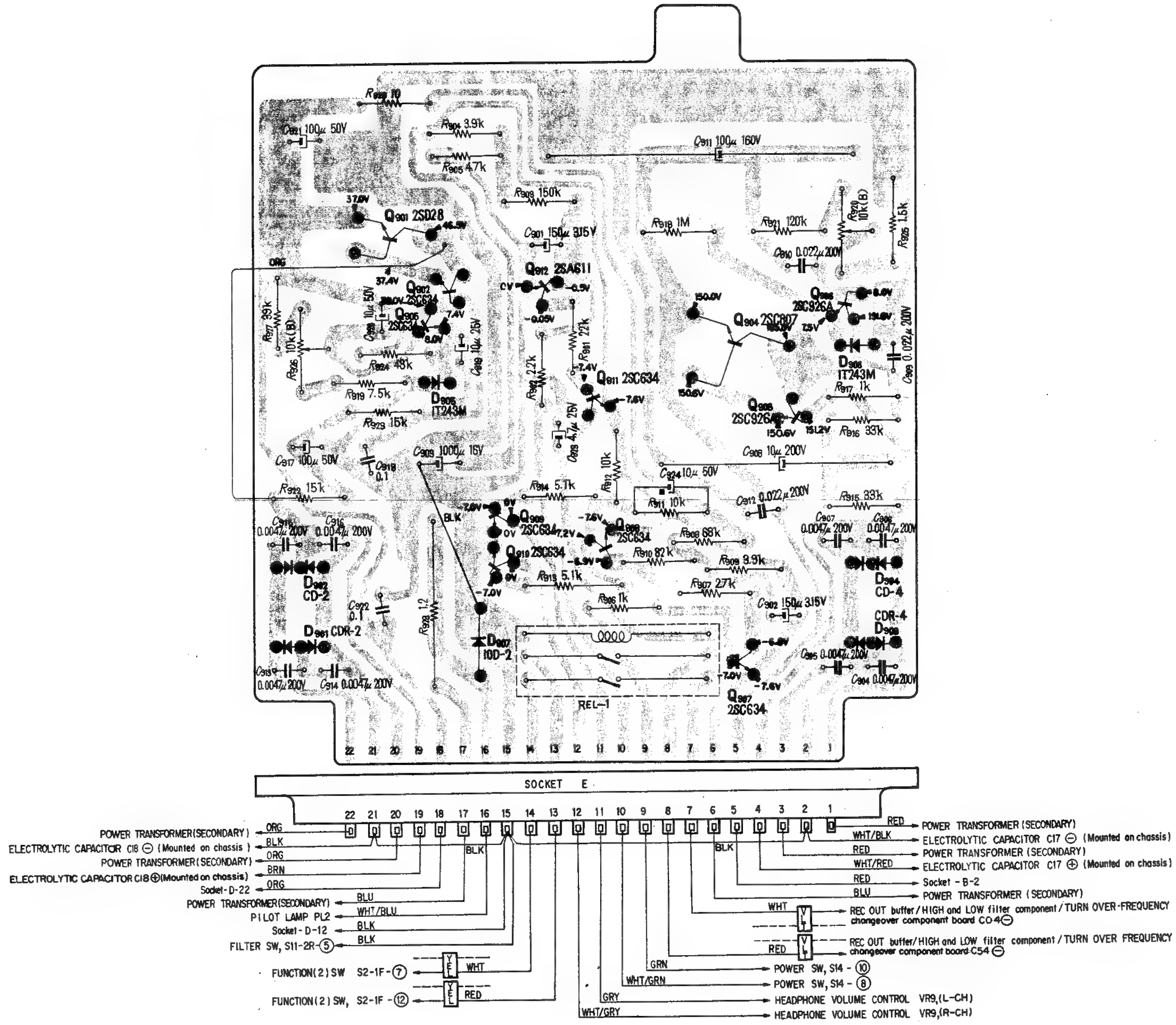


— *Component Side* —

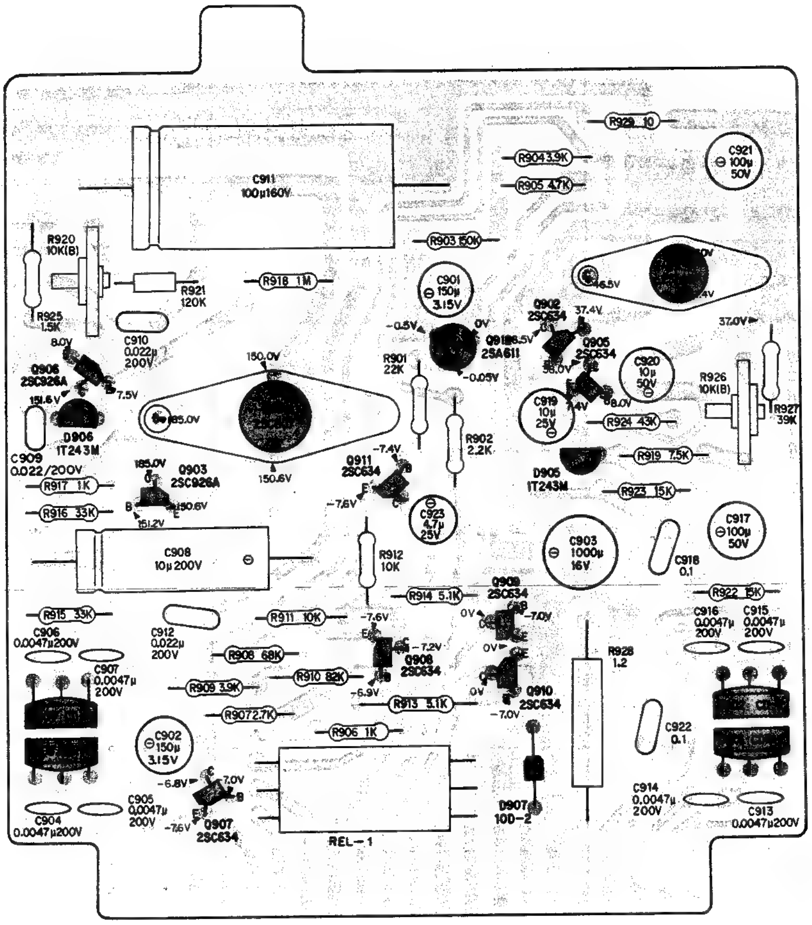


4-5. MOUNTING DIAGRAM – "E" PCB: Muting/Power Supply Board

– Conductor Side –

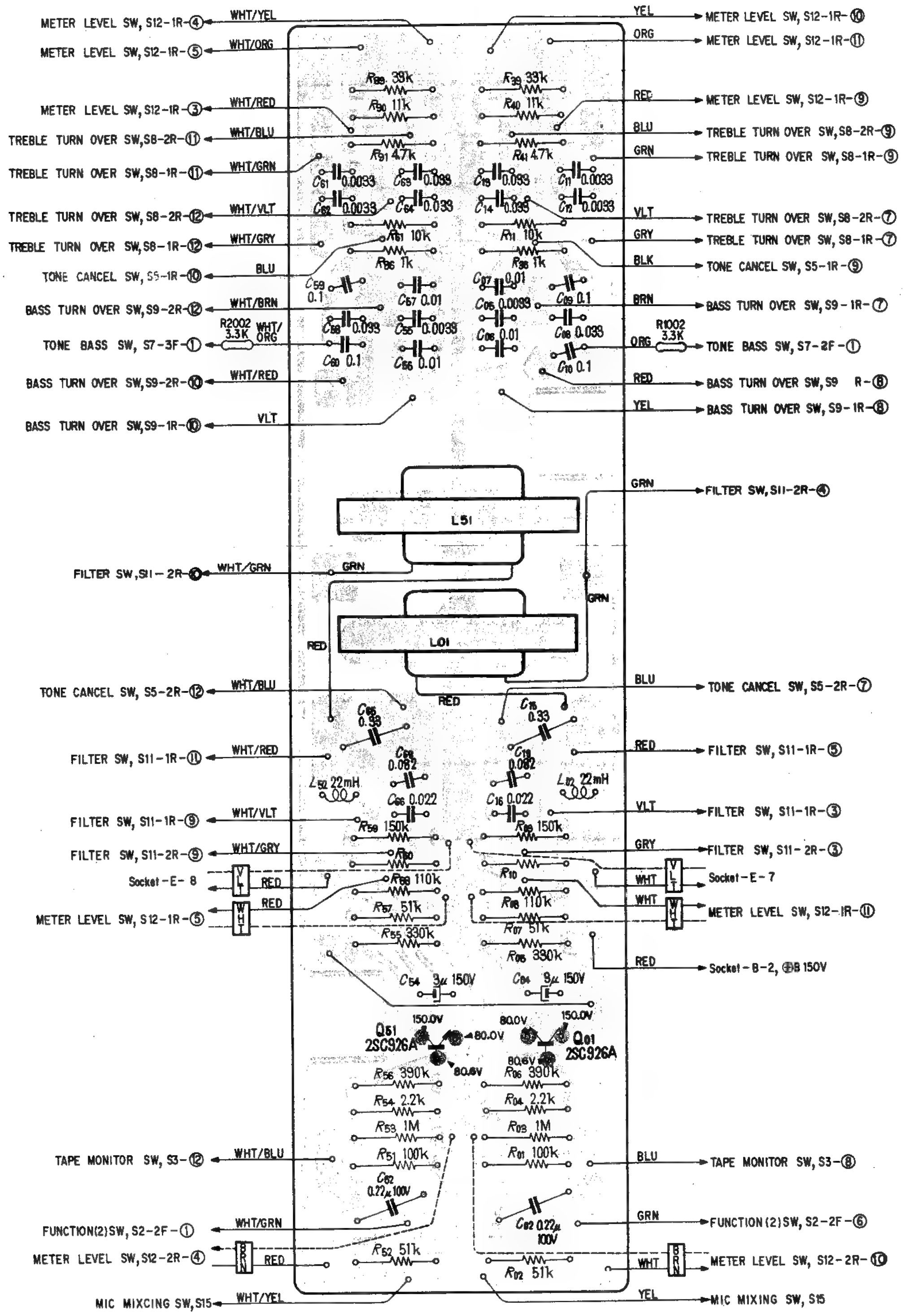


– Conponent Side –

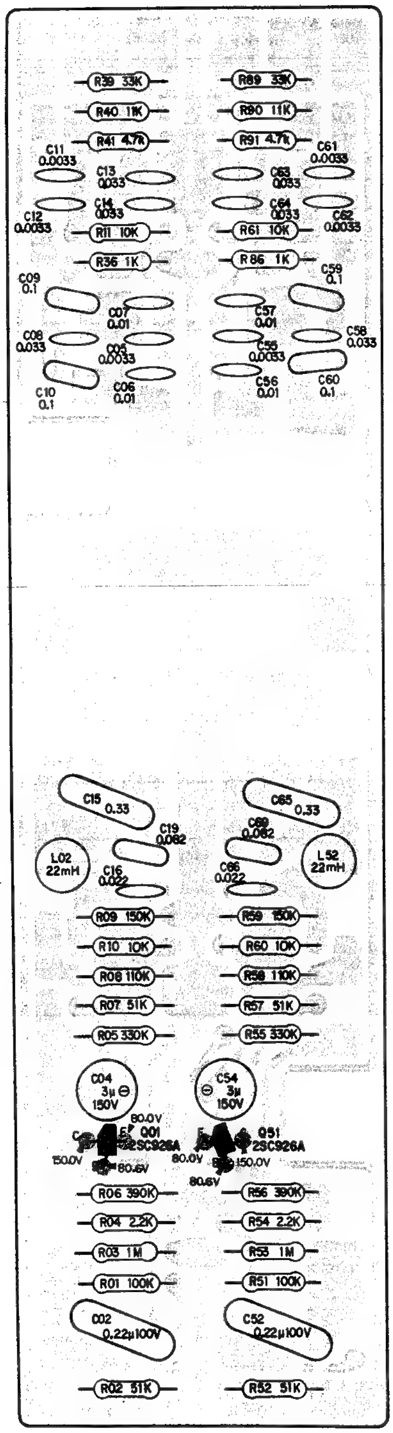


4-6. MOUNTING DIAGRAM – "F" PCB: REC OUT Amplifier/High and Low Filter Component/Turnover Frequency Changeover Component Board

– Conductor Side –

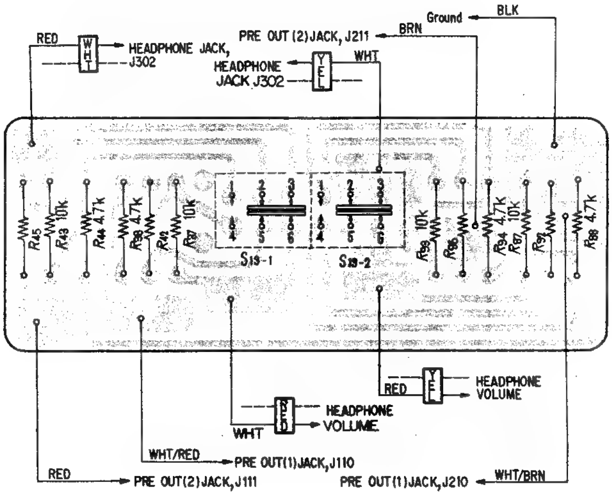


– Component Side –

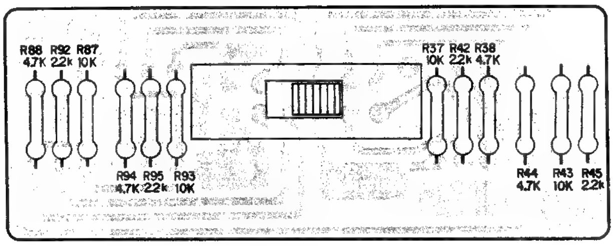


4-7. MOUNTING DIAGRAM – "G" PCB: OUTPUT LEVEL Changeover Switch Board

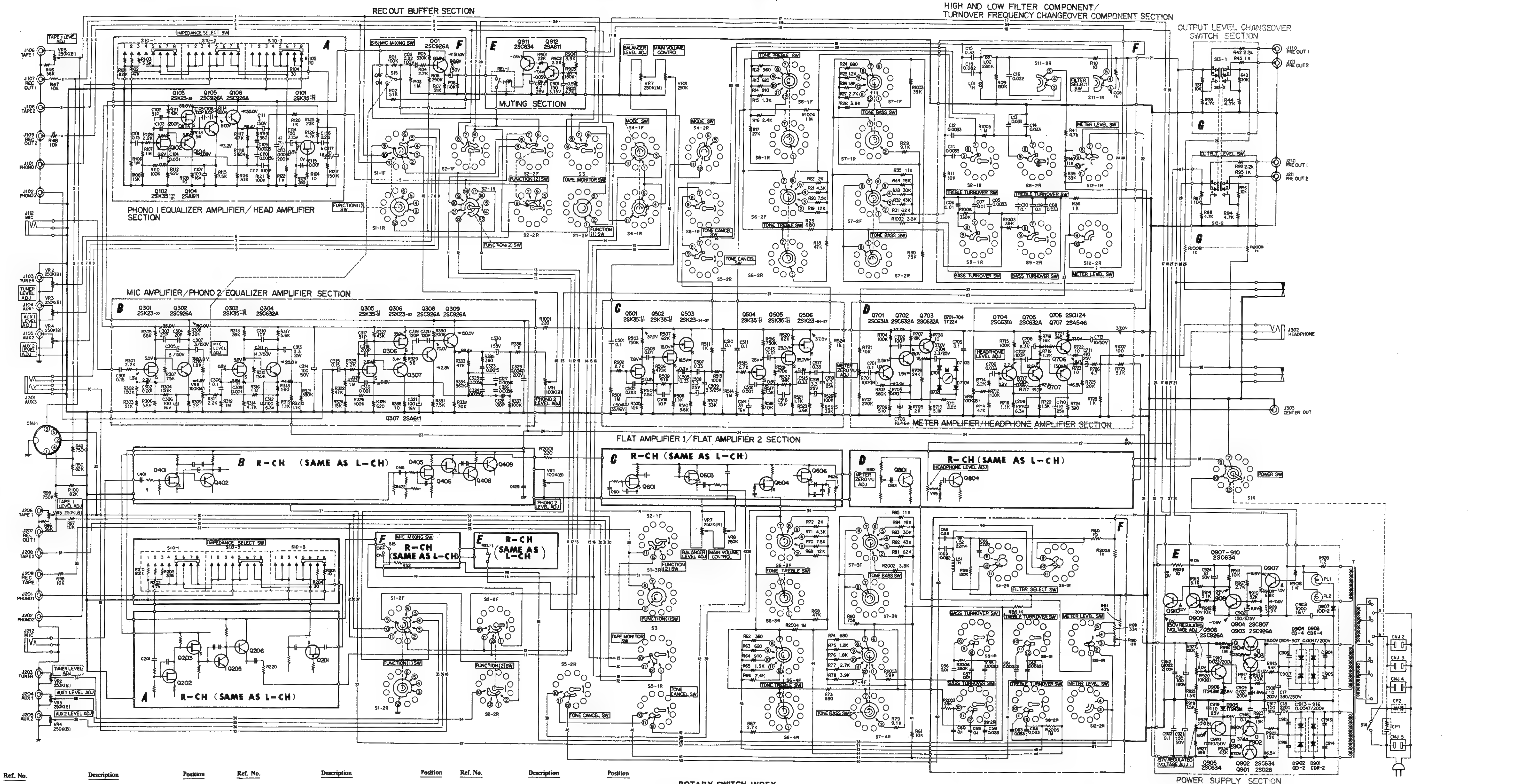
– Conductor Side –



– Component Side –

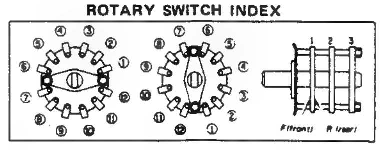


4-8. SCHEMATIC DIAGRAM

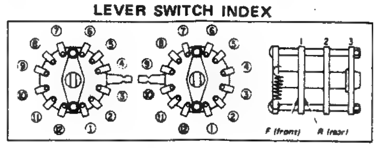


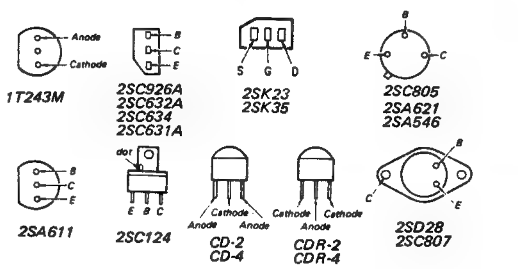
Ref. No.	Description	Position	Ref. No.	Description	Position	Ref. No.	Description	Position
S1	FUNCTION (1) SW (MIC - PHONO 2 - AUX 1 - AUX 2 - AUX 3 - TAPE TO TAPE 1-2, - TAPE TO TAPE 2-1)	MIC	S6	TONE TREBLE SW	-10 dB	S12	METER LEVEL SW (MIC - 0 dB - (-10 dB) - (-20 dB))	MIC
S2	FUNCTION (2) SW (TUNER - FUNCTION (1) - PHONO 1)	FUNCTION (1)	S7	TONE BASS SW	-10 dB	S13	OUTPUT LEVEL SW (1 V - 0.3 V)	1 V
S3	TAPE MONITOR SW (TAPE 2 - SOURCE - TAPE 1)	SOURCE	S8	TREBLE TURNOVER SW (2.5 kHz - 5 kHz)	2.5 kHz	S14	POWER SW (ON - OFF)	OFF
S4	MODE SW (CHECK "L" - CHECK "R" - REVERSE - STEREO - L+R - LEFT - RIGHT)	REVERSE	S9	BASS TURNOVER SW (500 Hz - 250 Hz)	500 Hz	S15	MIC MIXING SW (ON - OFF)	OFF
S5	TONE CANCEL SW (TONE ON - CANCEL)	TONE ON	S10	IMPEDANCE SELECTOR SW	10 Ω			
			S11	FILTER SW (LOW (50 Hz) - OFF - HIGH (9 kHz) - BOTH)	LOW (50 Hz)			

ROTARY SWITCH INDEX



LEVER SWITCH INDEX





Note:
All resistance values are in ohms. k = 1,000, M = 1,000 k
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages represent an average value and should hold within ±20%.
All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.

SONY
TA-2000F

SECTION 5
REPACKING

The TA-2000F's original shipping carton and packing materials are the ideal container for shipping the unit. However to secure the maximum protection, the TA-2000F must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 5-1.

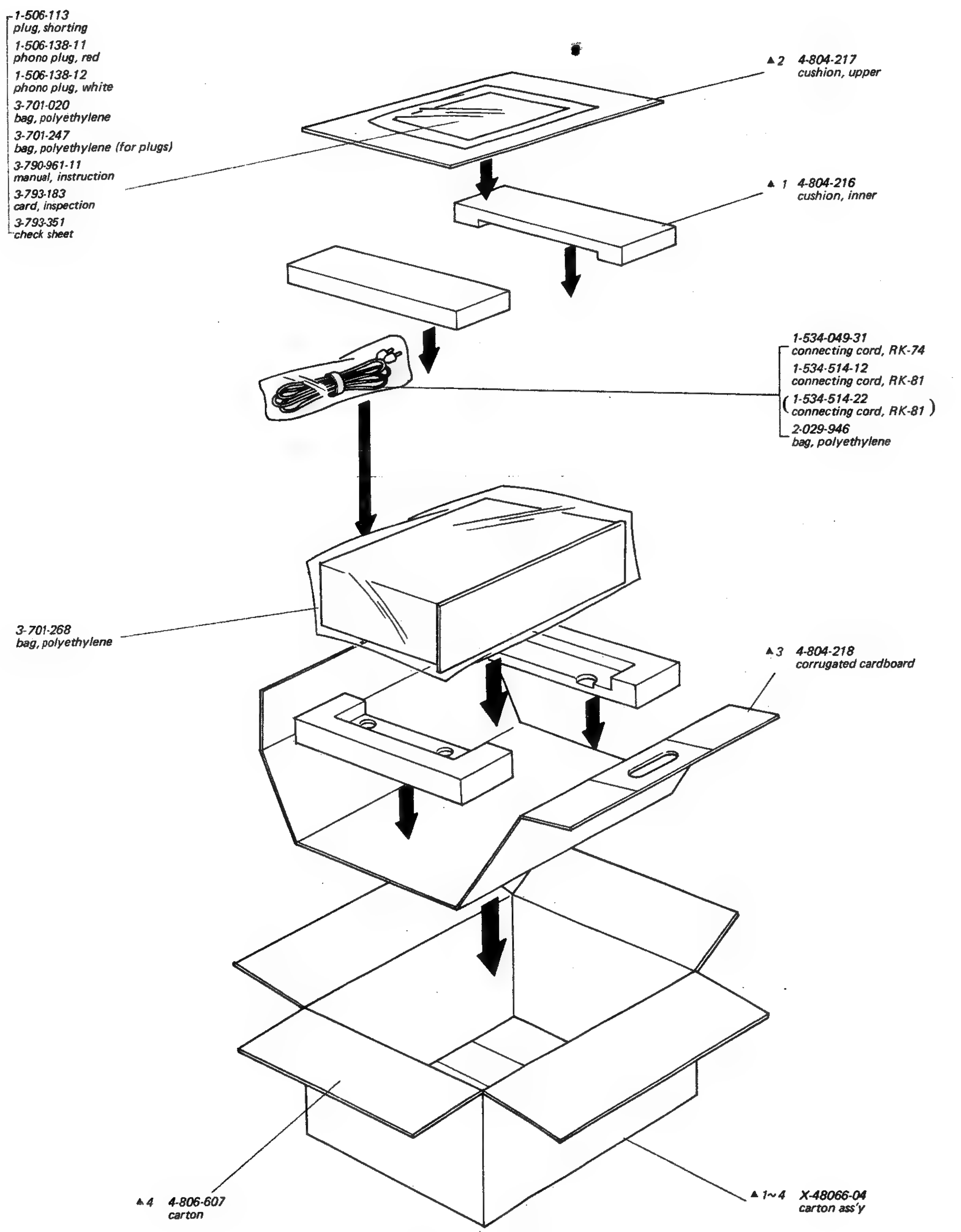
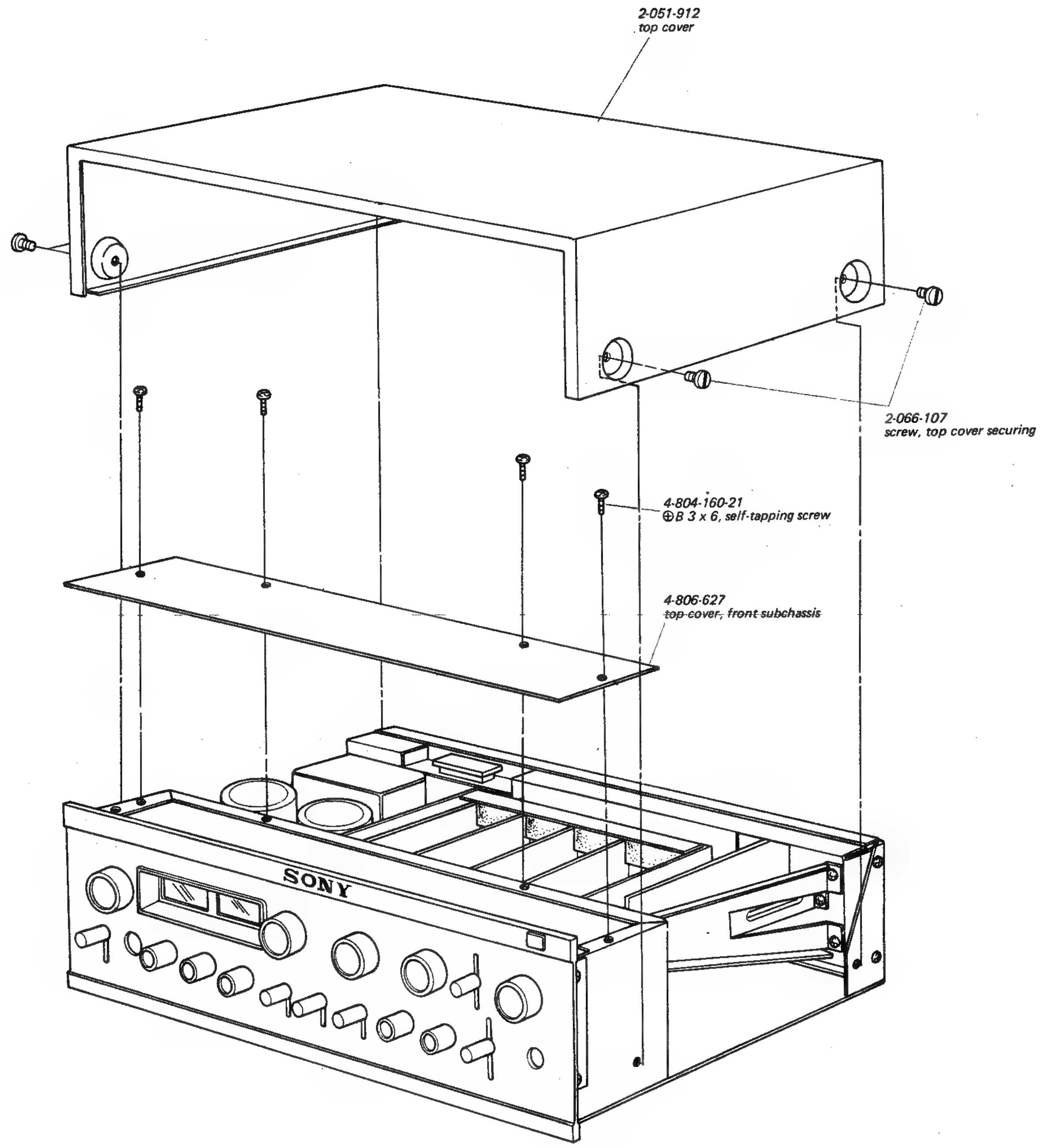
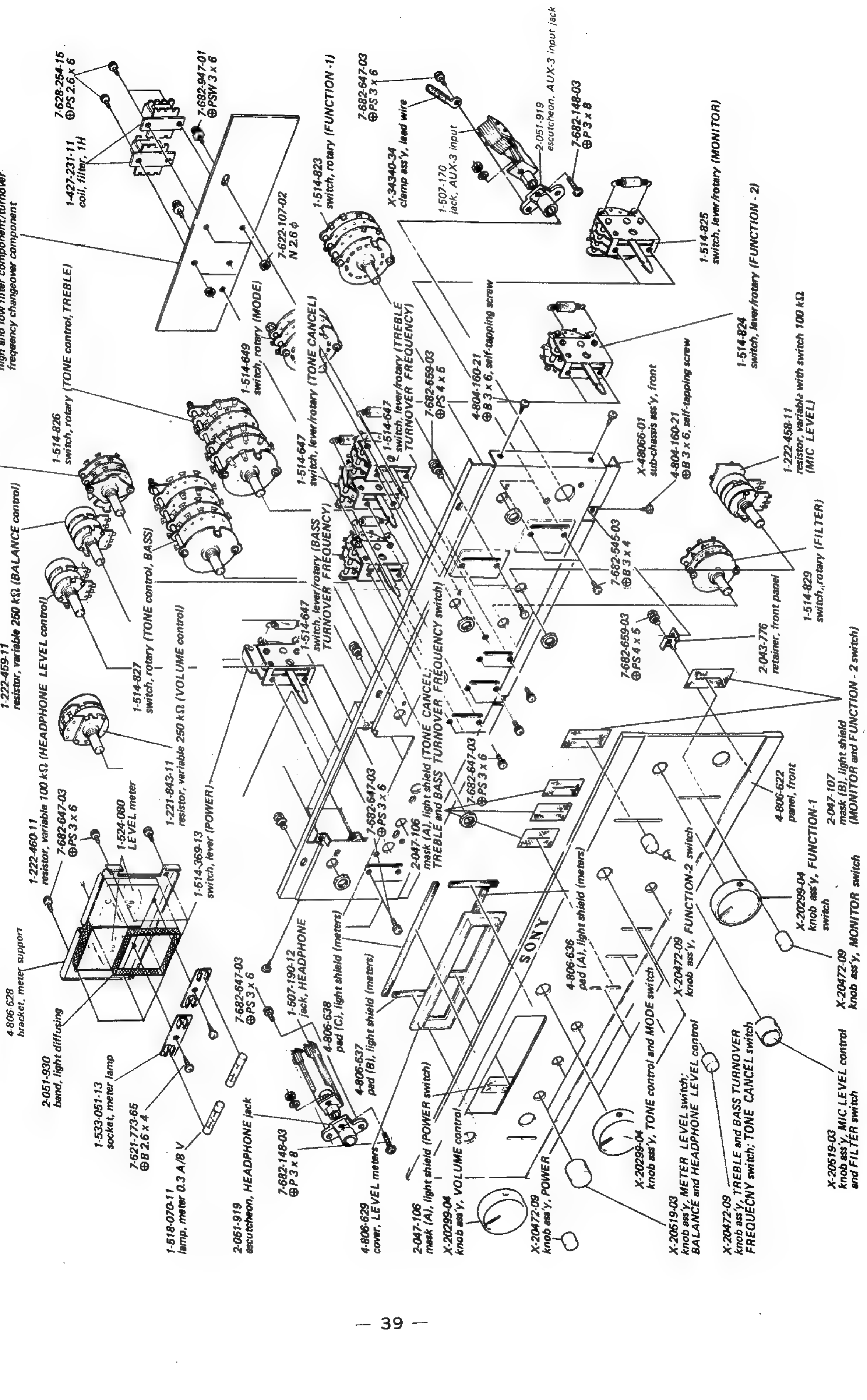


Fig. 5-1. Repacking

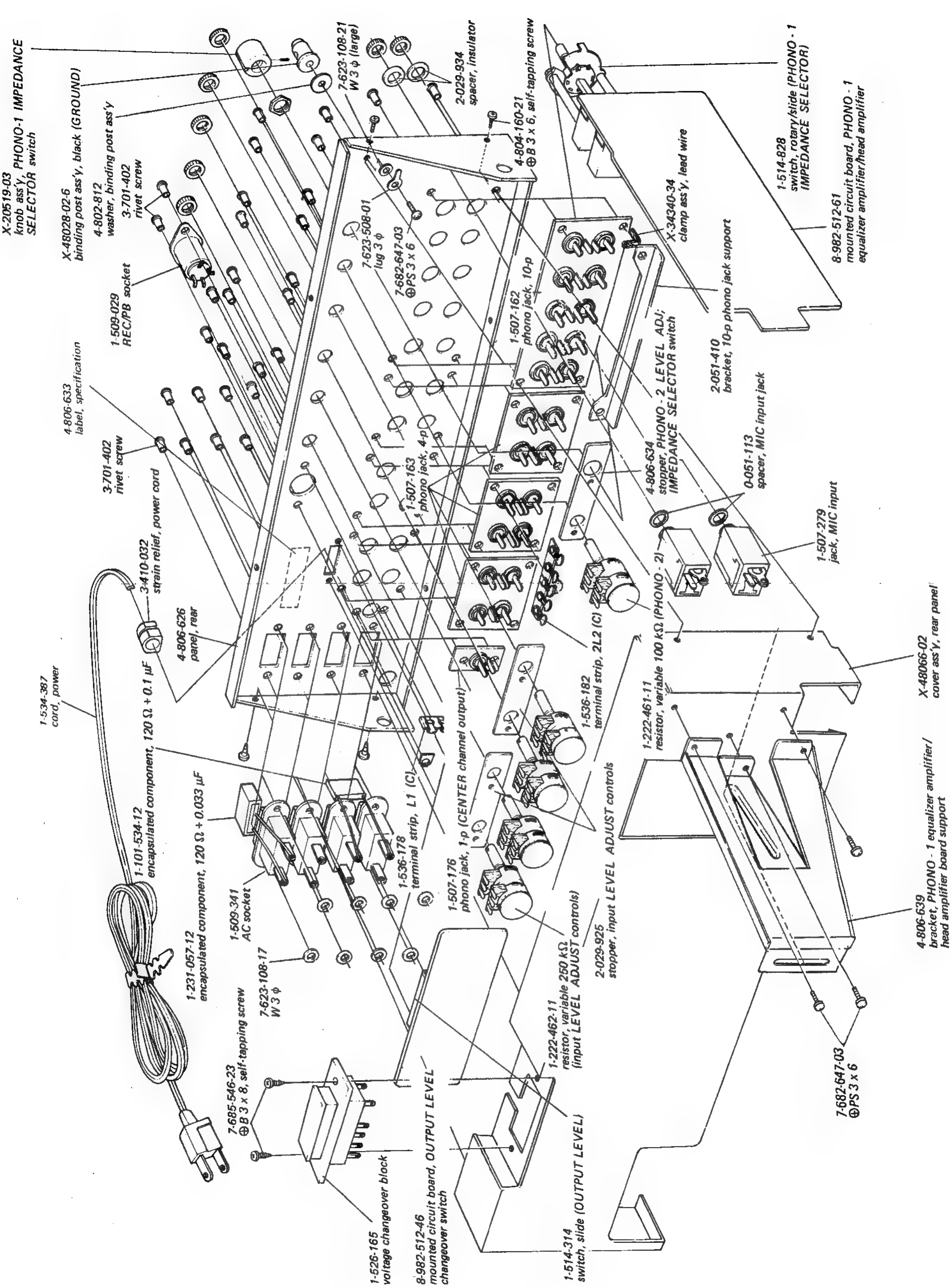
Note: Carton ass'y includes all the parts marked ▲

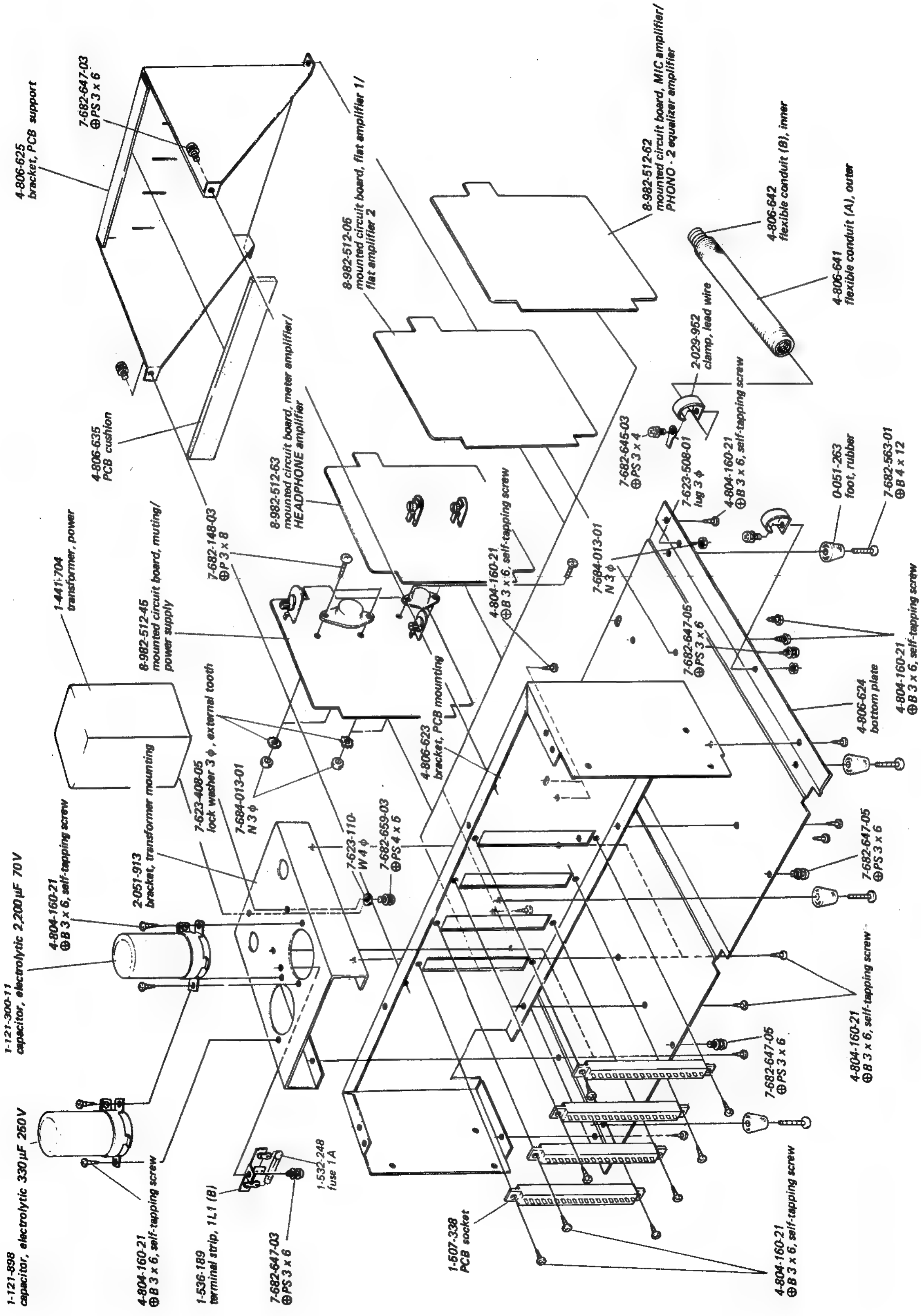
SECTION 6
EXPLODED VIEW





7-628-254-15 ⊕PS 2.6 x 6
7-682-947-01 ⊕PSW 3 x 6
1-427-231-11 coil, filter, 1H
8-982-512-78 mounted circuit board, REC OUT buffer/ high and low filter component/turnover frequency changeover component
7-622-107-02 N 2.6φ
1-514-823 switch, rotary (FUNCTION-1)
7-682-647-03 ⊕PS 3 x 6
X-34340-34 clamp ass'y, lead wire
1-507-170 jack, AUX-3 input
2-051-919 escutcheon, AUX-3 input jack
7-682-148-03 ⊕P 3 x 8
1-514-825 switch, lever/rotary (MONITOR)
1-514-824 switch, lever/rotary (FUNCTION - 2)
1-514-649 switch, rotary (MODE)
1-514-647 switch, lever/rotary (TONE CANCEL)
switch, lever/rotary (TREBLE TURNOVER FREQUENCY)
7-682-659-03 ⊕PS 4 x 5
4-804-160-21 ⊕B 3 x 6, self-tapping screw
X-48066-01 sub-chassis ass'y, front
4-804-160-21 ⊕B 3 x 6, self-tapping screw
1-222-458-11 resistor, variable with switch 100 kΩ (MIC LEVEL)
1-514-830 switch, rotary (METER LEVEL)
1-514-826 switch, rotary (TONE control, TREBLE)
1-514-647 switch, lever/rotary (BASS TURNOVER FREQUENCY)
1-222-459-11 resistor, variable 250 kΩ (BALANCE control)
1-514-827 switch, rotary (TONE control, BASS)
7-682-545-03 ⊕B 3 x 4
1-514-829 switch, rotary (FILTER)
7-682-659-03 ⊕PS 4 x 5
2-043-776 retainer, front panel
1-514-647 switch, lever/rotary (TONE CANCEL, TREBLE and BASS TURNOVER FREQUENCY switch)
1-222-460-11 resistor, variable 100 kΩ (HEADPHONE LEVEL control)
1-221-843-11 resistor, variable 250 kΩ (VOLUME control)
1-514-369-13 switch, lever (POWER)
7-682-647-03 ⊕PS 3 x 6
1-524-080 LEVEL meter
7-682-647-03 ⊕PS 3 x 6
7-682-647-03 ⊕PS 3 x 6
2-047-106 mask (A), light shield (TONE CANCEL, TREBLE and BASS TURNOVER FREQUENCY switch)
7-682-647-03 ⊕PS 3 x 6
4-806-622 panel, front
2-047-107 mask (B), light shield (MONITOR and FUNCTION - 2 switch)
4-806-628 bracket, meter support
2-051-930 band, light diffusing
1-533-051-13 socket, meter lamp
7-621-773-65 ⊕B 2.6 x 4
1-518-070-11 lamp, meter 0.3 A/8 V
7-682-647-03 ⊕PS 3 x 6
1-507-190-12 jack, HEADPHONE
4-806-638 pad (C), light shield (meters)
4-806-637 pad (B), light shield (meters)
2-051-919 escutcheon, HEADPHONE jack
7-682-148-03 ⊕P 3 x 8
4-806-629 cover, LEVEL meters
2-047-106 mask (A), light shield (POWER switch)
X-20299-04 knob ass'y, VOLUME control
X-20472-09 knob ass'y, POWER
4-806-636 pad (A), light shield (meters)
SONY
X-20299-04 knob ass'y, TONE control and MODE switch
X-20472-09 knob ass'y, FUNCTION-2 switch
X-20299-04 knob ass'y, FUNCTION-1 switch
X-20472-09 knob ass'y, MONITOR switch
X-20519-03 knob ass'y, METER LEVEL switch; BALANCE and HEADPHONE LEVEL control
X-20472-09 knob ass'y, TREBLE and BASS TURNOVER FREQUECNY switch; TONE CANCEL switch
X-20519-03 knob ass'y, MIC LEVEL control and FILTER switch


X-20519-03
knob ass'y, PHONO-1 IMPEDANCE SELECTOR switch
X-48028-02-6
binding post ass'y, black (GROUND)
4-802-812
washer, binding post ass'y
3-701-402
rivet screw
1-509-029
REC/PB socket
4-806-633
label, specification
3-701-402
rivet screw
1-534-387
cord, power
3-410-032
strain relief, power cord
4-806-626
panel, rear
1-101-534-12
encapsulated component, 120 Ω + 0.1 µF
1-231-057-12
encapsulated component, 120 Ω + 0.033 µF
7-685-546-23
⊕B 3 x 8, self-tapping screw
1-509-341
AC socket
7-623-108-17
W 3 φ
1-526-165
voltage changeover block
8-982-512-46
mounted circuit board, OUTPUT LEVEL changeover switch
1-536-178
terminal strip, L1 (C)
1-507-176
phono jack, 1-p (CENTER channel output)
1-514-314
switch, slide (OUTPUT LEVEL)
1-222-462-11
resistor, variable 250 kΩ (input LEVEL ADJUST controls)
2-029-925
stopper, input LEVEL ADJUST controls
1-536-182
terminal strip, 2L2 (C)
1-222-461-11
resistor, variable 100 kΩ (PHONO - 2)
1-507-163
phono jack, 4-p
7-623-508-01
lug 3 φ
7-682-647-03
⊕PS 3 x 6
7-623-108-21
W 3 φ (large)
2-029-934
spacer, insulator
4-804-160-21
⊕B 3 x 6, self-tapping screw
1-507-162
phono jack, 10-p
4-806-634
stopper, PHONO - 2 LEVEL ADJ; IMPEDANCE SELECTOR switch
X-34340-34
clamp ass'y, lead wire
2-051-410
bracket, 10-p phono jack support
0-051-113
spacer, MIC input jack
1-514-828
switch, rotary/slide (PHONO - 1 IMPEDANCE SELECTOR)
8-982-512-61
mounted circuit board, PHONO - 1 equalizer amplifier/head amplifier
1-507-279
jack, MIC input
7-682-647-03
⊕PS 3 x 6
4-806-639
bracket, PHONO - 1 equalizer amplifier/head amplifier board support
X-48066-02
cover ass'y, rear panel



4-806-625 bracket, PCB support
7-682-647-03 ⊕PS 3 x 6
8-982-512-62 mounted circuit board, MIC amplifier/ PHONO-2 equalizer amplifier
4-806-642 flexible conduit (B), inner
4-806-641 flexible conduit (A), outer
8-982-512-06 mounted circuit board, flat amplifier 1/ flat amplifier 2
2-029-952 clamp, lead wire
4-806-635 PCB cushion
8-982-512-63 mounted circuit board, meter amplifier/ HEADPHONE amplifier
7-682-645-03 ⊕PS 3 x 4
7-623-508-01 lug 3 φ
4-804-160-21 ⊕B 3 x 6, self-tapping screw
0-051-263 foot, rubber
7-682-563-01 ⊕B 4 x 12
1-441-704 transformer, power
8-982-512-45 mounted circuit board, muting/ power supply
7-682-148-03 ⊕P 3 x 8
4-804-160-21 ⊕B 3 x 6, self-tapping screw
7-684-013-01 N 3 φ
7-682-647-05 ⊕PS 3 x 6
4-806-623 bracket, PCB mounting
4-806-624 bottom plate
4-804-160-21 ⊕B 3 x 6, self-tapping screw
7-623-408-05 lock washer 3 φ, external tooth
7-684-013-01 N 3 φ
7-623-110- W 4 φ
7-682-659-03 ⊕PS 4 x 6
2-051-913 bracket, transformer mounting
4-804-160-21 ⊕B 3 x 6, self-tapping screw
1-121-300-11 capacitor, electrolytic 2,200 μF 70 V
7-682-647-05 ⊕PS 3 x 6
4-804-160-21 ⊕B 3 x 6, self-tapping screw
1-121-898 capacitor, electrolytic 330 μF 250 V
4-804-160-21 ⊕B 3 x 6, self-tapping screw
1-536-189 terminal strip, 1L1 (B)
1-532-248 fuse 1A
7-682-647-03 ⊕PS 3 x 6
1-507-338 PCB socket
4-804-160-21 ⊕B 3 x 6, self-tapping screw

SECTION 7
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description

MOUNTED CIRCUIT BOARDS

Ref. No.	Part No.	Description
	8-982-512-05	flat amplifier 1/flat amplifier 2 circuit board
	8-982-512-45	muting/power supply circuit board
	8-982-512-46	OUTPUT LEVEL changeover switch circuit board
	8-982-512-61	PHONO-1 equalizer amplifier/head amplifier circuit board
	8-982-512-62	MIC amplifier/PHONO-2 equalizer amplifier circuit board
	8-982-512-63	meter amplifier/HEADPHONE amplifier circuit board
	8-982-512-78	REC OUT buffer/high and low filter component/turnover frequency changeover component circuit board

SEMICONDUCTORS

Ref. No.	Part No.	Description
D701 (D801)		diode, 1T22A
D702 (D802)		diode, 1T22A
D703 (D803)		diode, 1T22A
D704 (D804)		diode, 1T22A
D901		diode, CDR-2
D902		diode, CD-2
D903		diode, CDR-4
D904		diode, CD-4
D905		diode, 1T243M
D906		diode, 1T243M
D907		diode, 10D-2
Q101 (Q201)		FET, 2SK35-13 or -23
Q102 (Q202)		FET, 2SK35-11 or -21
Q103 (Q203)		FET, 2SK23-32
Q104 (Q204)		transistor, 2SA611
Q105 (Q205)		transistor, 2SC926A
Q106 (Q206)		transistor, 2SC926A
Q301 (Q401)		FET, 2SK23-22
Q302 (Q402)		transistor, 2SC926A
Q303 (Q403)		FET, 2SK35-13 or -23
Q304 (Q404)		transistor, 2SC632A
Q305 (Q405)		FET, 2SK35-11 or -21
Q306 (Q406)		FET, 2SK23-32
Q307 (Q407)		transistor, 2SA611
Q308 (Q408)		transistor, 2SC926A
Q309 (Q409)		transistor, 2SC926A
Q501 (Q601)		FET, 2SK35-11 or -21
Q502 (Q602)		FET, 2SK35-11 or -21
Q503 (Q603)		FET, 2SK23-34, -35, -36 or -37
Q504 (Q604)		FET, 2SK35-11 or -21
Q505 (Q605)		FET, 2SK35-11 or -21
Q506 (Q606)		FET, 2SK23-34, -35, -36 or -37
Q701 (Q801)		transistor, 2SC631A
Q702 (Q802)		transistor, 2SC632A
Q703 (Q803)		transistor, 2SC632A
Q704 (Q804)		transistor, 2SC631A
Q705 (Q805)		transistor, 2SC632A
Q706 (Q806)		transistor, 2SC1124
Q707 (Q807)		transistor, 2SA546
Q901		transistor, 2SD28
Q902		transistor, 2SC634
Q903		transistor, 2SC926A
Q904		transistor, 2SC807
Q905		transistor, 2SC634
Q906		transistor, 2SC926A
Q907		transistor, 2SC634
Q908		transistor, 2SC634
Q909		transistor, 2SC634
Q910		transistor, 2SC634
Q911		transistor, 2SC634
Q912		transistor, 2SA611
Q01 (Q51)		transistor, 2SC926A

TRANSFORMERS AND COILS

Ref. No.	Part No.	Description
L01 (L51)	1-427-231-11	coil, filter; 1H
L02 (L52)	1-407-408-11	coil, choke; 22 mH
T	1-441-704	transformer, power

CAPACITORS

All capacitance values are in μF except as indicated with p, which means $\mu\mu$F.

Ref. No.	Part No.	Value	Tolerance	Voltage	Type
C101 (C201)	1-105-687-12	0.15	±10%	50 V	mylar
C102 (C202)	1-101-882	51 p	±5%	50 V	ceramic
C103 (C203)	1-101-916	200 p	±5%	50 V	ceramic
C104 (C204)	1-105-821-12	0.001	±20%	50 V	mylar
C105 (C205)	1-107-169	100 p	±5%	500 V	silvered mica

Ref. No.	Part No.	Description			
C106 (C206)	1-107-169	100p	±5%	500V	silvered mica
C107 (C207)	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C108 (C208)		– deleted –			
C109 (C209)	1-105-503-12	0.0015	±5%	50V	mylar
C110 (C210)	1-105-510-12	0.0056	±20%	50V	mylar
C111 (C211)	1-121-707	3	$\pm^{150}_{10}$%	150V	electrolytic
C112 (C212)	1-107-169	100p	±5%	500V	silvered mica
C113 (C213)	1-105-909-12	0.0047	±20%	200V	mylar
C114 (C214)	1-121-741	150	±20%	3.15V	electrolytic
C115 (C215)	1-105-821-12	0.001	±20%	50V	mylar
C116 (C216)	1-105-689-12	0.22	±10%	50V	mylar
C117 (C217)	1-121-748	10	$\pm^{100}_{10}$%	25V	electrolytic
C301 (C401)	1-105-687-12	0.15	±10%	50V	mylar
C302 (C402)	1-105-821-12	0.001	±20%	50V	mylar
C303 (C403)	1-101-864	20p	±5%	50V	ceramic
C304 (C404)	1-101-864	20p	±5%	50V	ceramic
C305 (C405)	1-121-707	3	$\pm^{150}_{10}$%	150V	electrolytic
C306 (C406)	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C307 (C407)	1-121-707	3	$\pm^{150}_{10}$%	150V	electrolytic
C308 (C408)	1-105-685-12	0.1	±10%	50V	mylar
C309 (C409)	1-105-821-12	0.001	±20%	50V	mylar
C310 (C410)	1-101-959	10p	±5%	50V	ceramic
C311 (C411)	1-121-396	4.7	$\pm^{150}_{10}$%	50V	electrolytic
C312 (C412)	1-121-413	100	$\pm^{100}_{10}$%	6.3V	electrolytic
C313 (C413)	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C314 (C414)	1-121-417	100	$\pm^{100}_{10}$%	50V	electrolytic
C315 (C415)	1-105-687-12	0.15	±10%	50V	mylar
C316 (C416)	1-105-821-12	0.001	±20%	50V	mylar
C317 (C417)	1-101-882	51p	±5%	50V	ceramic
C318 (C418)	1-101-916	200p	±5%	50V	ceramic
C319 (C419)	1-101-819	120p	±5%	50V	ceramic
C320 (C420)	1-101-819	120p	±5%	50V	ceramic
C321 (C421)	1-121-415	100	$\pm^{100}_{10}$%	16V	electrolytic
C322 (C422)		– deleted –			
C323 (C423)	1-106-005-12	0.0015	±5%	50V	mylar
C324 (C424)	1-106-019-12	0.0056	±5%	50V	mylar
C325 (C425)	1-106-019-12	0.0056	±5%	50V	mylar
C326 (C426)	1-106-019-12	0.0056	±5%	50V	mylar
C327 (C427)	1-106-019-12	0.0056	±5%	50V	mylar
C328 (C428)	1-101-896	100p	±5%	50V	ceramic
C329 (C429)	1-105-909-12	0.0047	±20%	200V	mylar
C330 (C430)	1-121-707	3	$\pm^{150}_{10}$%	150V	electrolytic
C501 (C601)	1-105-685-12	0.1	±10%	50V	mylar
C502 (C602)	1-105-821-12	0.001	±20%	50V	mylar
C503 (C603)	1-105-673-12	0.01	±10%	50V	mylar
C504 (C604)	1-121-403	33	$\pm^{100}_{10}$%	16V	electrolytic
C505 (C605)	1-105-691-12	0.33	±10%	50V	mylar
C506 (C606)	1-101-861	15p	±5%	50V	ceramic
C507 (C607)	1-105-691-12	0.33	±10%	50V	mylar
C508 (C608)	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C509 (C609)	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C510 (C610)	1-105-685-12	0.1	±10%	50V	mylar
C511 (C611)	1-105-685-12	0.1	±10%	50V	mylar
C512 (C612)	1-105-821-12	0.001	±20%	50V	mylar
C513 (C613)	1-105-673-12	0.01	±10%	50V	mylar
C514 (C614)	1-121-403	33	$\pm^{100}_{10}$%	16V	electrolytic
C515 (C615)	1-105-691-12	0.33	±10%	50V	mylar
C516 (C616)	1-101-861	15p	±5%	50V	ceramic
C517 (C617)	1-105-691-12	0.33	±10%	50V	mylar
C518 (C618)	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C519 (C619)	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C701 (C801)	1-105-685-12	0.1	±10%	50V	mylar
C702 (C802)	1-101-896	100p	±5%	50V	ceramic
C703 (C803)	1-121-347	10	$\pm^{100}_{10}$%	16V	electrolytic
C704 (C804)	1-121-344	3.3	$\pm^{150}_{10}$%	25V	electrolytic
C705 (C805)	1-105-685-12	0.1	±10%	50V	mylar
C706 (C806)	1-105-679-12	0.033	±10%	50V	mylar
C707 (C807)	1-101-896	100p	±5%	50V	ceramic
C708 (C808)	1-121-413	100	$\pm^{100}_{10}$%	6.3V	electrolytic
C709 (C809)	1-121-413	100	$\pm^{100}_{10}$%	6.3V	electrolytic
C710 (C810)	1-121-283	10	$\pm^{100}_{10}$%	25V	electrolytic
C711 (C811)	1-121-733	470	$\pm^{100}_{10}$%	25V	electrolytic
C713 (C813)	1-121-348	10	$\pm^{100}_{10}$%	50V	electrolytic
C901	1-121-741	150	±20%	3.15V	electrolytic
C902	1-121-741	150	±20%	3.15V	electrolytic
C903	1-121-245	1,000	$\pm^{100}_{10}$%	16V	electrolytic
C904	1-105-909-12	0.0047	±20%	200V	mylar
C905	1-105-909-12	0.0047	±20%	200V	mylar
C906	1-105-909-12	0.0047	±20%	200V	mylar
C907	1-105-909-12	0.0047	±20%	200V	mylar
C908	1-119-313	10	$\pm^{100}_{10}$%	200V	electrolytic
C909	1-105-917-12	0.022	±20%	200V	mylar
C910	1-105-917-12	0.022	±20%	200V	mylar
C911	1-119-314	100	$\pm^{100}_{10}$%	160V	electrolytic
C912	1-105-917-12	0.022	±20%	200V	mylar
C913	1-105-909-12	0.0047	±20%	200V	mylar
C914	1-105-909-12	0.0047	±20%	200V	mylar
C915	1-105-909-12	0.0047	±20%	200V	mylar
C916	1-105-909-12	0.0047	±20%	200V	mylar
C917	1-121-417	100	$\pm^{100}_{10}$%	50V	electrolytic
C918	1-105-685-12	0.1	±10%	50V	mylar
C919	1-121-398	10	$\pm^{100}_{10}$%	25V	electrolytic

Ref. No.	*Part No.*	*Description*			
C920	1-121-738	10	$\pm^{100}_{10}$%	50V	electrolytic
C921	1-121-417	100	$\pm^{100}_{10}$%	50V	electrolytic
C922	1-105-685-12	0.1	±10%	50V	mylar
C923	1-121-395	4.7	$\pm^{150}_{10}$%	25V	electrolytic
C924	1-121-738	10	$\pm^{100}_{10}$%	50V	electrolytic
C02 (C52)	1-105-729-12	0.22	±10%	100V	mylar
C04 (C54)	1-121-707	3	$\pm^{150}_{10}$%	150V	electrolytic
C05 (C55)	1-106-013-12	0.0033	±5%	50V	mylar
C06 (C56)	1-106-025-12	0.01	±5%	50V	mylar
C07 (C57)	1-106-025-12	0.01	±5%	50V	mylar
C08 (C58)	1-106-037-12	0.033	±5%	50V	mylar
C09 (C59)	1-106-049-12	0.1	±5%	50V	mylar
C10 (C60)	1-106-049-12	0.1	±5%	50V	mylar
C11 (C61)	1-106-013-12	0.0033	±5%	50V	mylar
C12 (C62)	1-106-013-12	0.0033	±5%	50V	mylar
C13 (C63)	1-106-037-12	0.033	±5%	50V	mylar
C14 (C64)	1-106-037-12	0.033	±5%	50V	mylar
C15 (C65)	1-105-691-12	0.33	±5%	50V	mylar
C16 (C66)	1-106-033-12	0.022	±5%	50V	mylar
C17	1-121-898	330		250V	electrolytic
C18	1-121-300	2,200	$\pm^{100}_{10}$%	70V	electrolytic
C19 (C69)	1-106-047-12	0.082	±5%	50V	mylar

RESISTORS

All resistance values are in ohms, ±5%, ¼ watts and carbon type unless otherwise indicated.
Note that the suffix "09" in the Parts Numbers indicates noiseless type.

Ref. No.	*Part No.*	*Description*	
R101 (R201)	1-242-719-09	82 k	
R102 (R202)	1-242-713	47 k	
R103 (R203)	1-242-709-09	33 k	
R104 (R204)	1-242-636	30	
R105 (R205)	1-242-625	10	
R106 (R206)	1-242-745-09	1 M	
R107 (R207)	1-242-745-09	1 M	
R108 (R208)	1-242-701-09	15 k	
R109 (R209)	1-242-681-09	2.2 k	
R110 (R210)	1-242-721-09	100 k	
R111 (R211)	1-242-712-09	43 k	
R112 (R212)	1-211-912	620	±1%
R113 (R213)	1-242-643	56	
R114 (R214)	1-242-728-09	200 k	
R115 (R215)	1-244-694-09	7.5 k	
R116 (R216)	1-244-708-09	30 k	
R117 (R217)	1-242-713	47 k	
R118 (R218)	1-242-739-09	560 k	
R119 (R219)	1-242-662	360	
R120 (R220)	1-244-673-09	1 k	
R121 (R221)	1-244-721-09	100 k	
R122 (R222)	1-242-673-09	1 k	
R123 (R223)	1-242-664	330	
R124 (R224)	1-242-625	10	
R125 (R225)	1-244-705-09	22 k	
R126 (R226)	1-242-689	4.7 k	
R127 (R227)	1-242-725-09	150 k	
R128 (R228)	1-244-625	10	
R301 (R401)	1-244-681-09	2.2 k	
R302 (R402)	1-244-721-09	100 k	
R303 (R403)	1-244-714-09	51 k	
R304 (R404)	1-244-721-09	100 k	
R305 (R405)	1-244-717-09	68 k	
R306 (R406)	1-244-691	5.6 k	
R307 (R407)	1-211-922	75 k	±1%
R308 (R408)	1-244-708-09	30 k	
R309 (R409)	1-244-675-09	1.2 k	
R310 (R410)	1-244-675-09	1.2 k	
R311 (R411)	1-244-681-09	2.2 k	
R312 (R412)	1-244-745	1 M	
R313 (R413)	1-244-711-09	39 k	
R314 (R414)	1-210-505	4.7 k	±1%
R315 (R415)	1-211-925-09	150 k	±1%
R316 (R416)	1-244-745	1 M	
R317 (R417)	1-244-691-09	5.6 k	
R318 (R418)	1-244-667	560	
R319 (R419)	1-244-674-09	1.1 k	
R320 (R420)	1-244-674	1.1 k	
R321 (R421)	1-244-733	330 k	
R322 (R422)	1-244-713	47 k	
R323 (R423)	1-244-745	1 M	
R324 (R424)	1-244-701	15 k	
R325 (R425)	1-244-681	2.2 k	
R326 (R426)	1-244-721	100 k	
R327 (R427)	1-244-712-09	43 k	
R328 (R428)	1-244-668	620	
R329 (R429)	1-244-643	56	
R330 (R430)	1-244-728-09	200 k	
R331 (R431)	1-244-694-09	7.5 k	
R332 (R432)	1-244-708-09	30 k	
R333 (R433)	1-244-713	47 k	
R334 (R434)	1-244-739-09	560 k	
R335 (R435)	1-244-662	360	

Ref. No.	Part No.	Description			
R336 (R436)	1-244-673-09	1 k			
R337 (R437)	1-244-721-09	100 k			
R338 (R438)	1-244-625	10			
R501 (R601)	1-244-745-09	1 M			
R502 (R602)	1-244-683-09	2.7 k			
R503 (R603)	1-244-742-09	750 k			
R504 (R604)	1-211-916	7.5 k	±1%		
R505 (R605)	1-244-697-09	10 k			
R506 (R606)	1-244-737-09	470 k			
R507 (R607)	1-244-716-09	62 k			
R508 (R608)	1-244-674-09	1.1 k			
R509 (R609)	1-211-923	91 k	±1%		
R510 (R610)	1-244-686-09	3.6 k			
R511 (R611)	1-244-673-09	1 k			
R512 (R612)	1-244-709-09	33 k			
R513 (R613)	1-244-721-09	100 k			
R514 (R614)	1-244-745-09	1 M			
R515 (R615)	1-244-683-09	2.7 k			
R516 (R616)	1-244-742-09	750 k			
R517 (R617)	1-211-916	7.5 k	±1%		
R518 (R618)	1-244-697-09	10 k			
R519 (R619)	1-244-737-09	470 k			
R520 (R620)	1-244-716-09	62 k			
R521 (R621)	1-244-674-09	1.1 k			
R522 (R622)	1-211-923	91 k	±1%		
R523 (R623)	1-244-686-09	3.6 k			
R524 (R624)	1-244-673-09	1 k			
R525 (R625)	1-244-709-09	33 k			
R526 (R626)	1-244-721-09	100 k			
R701 (R801)	1-222-987	100 k (B), semi-fixed			
R702 (R802)	1-244-729-09	220 k			
R703 (R803)	1-244-739-09	560 k			
R704 (R804)	1-244-721-09	100 k			
R705 (R805)	1-244-665	470			
R706 (R806)	1-211-911	510	±1%		
R707 (R807)	1-244-703-09	18 k			
R708 (R808)	1-244-680-09	2 k			
R709 (R809)	1-211-920	24 k	±1%		
R710 (R810)	1-244-690-09	5.1 k			
R711 (R811)	1-211-917	8.2 k	±1%		
R712 (R812)	1-244-721-09	100 k			
R713 (R813)	1-244-713-09	47 k			
R714 (R814)	1-244-681-09	2.2 k			
R715 (R815)	1-244-721-09	100 k			
R716 (R816)	1-211-914	1.1 k	±1%		
R717 (R817)	1-244-735-09	390 k			

Ref. No.	Part No.	Description			
R718 (R818)	1-244-702-09	16 k			
R719 (R819)	1-244-675-09	1.2 k			
R720 (R820)	1-244-677-09	1.5 k			
R721 (R821)	1-202-563	390	±10%	½W	composition
R722 (R822)	1-244-625	10			
R723 (R823)	1-244-625	10			
R724 (R824)	1-202-563	390	±10%	½W	composition
R725 (R825)	1-211-919	20 k	±1%		
R726 (R826)	1-244-617	4.7			
R728 (R828)	1-244-673-09	1 k			
R729 (R829)	1-244-690-09	5.1 k			
R730 (R830)	1-244-625	10			
R731 (R831)	1-244-697-09	10 k			
R901	1-244-705	22 k			
R902	1-244-681	2.2 k			
R903	1-244-725	150 k			
R904	1-244-687	3.9 k			
R905	1-244-689	4.7 k			
R906	1-244-673	1 k			
R907	1-244-683	2.7 k			
R908	1-244-717	68 k			
R909	1-244-687	3.9 k			
R910	1-244-719	82 k			
R911	1-244-697	10 k			
R912	1-244-697	10 k			
R913	1-244-690	5.1 k			
R914	1-244-690	5.1 k			
R915	1-244-709	33 k			
R916	1-244-709	33 k			
R917	1-244-673	1 k			
R918	1-244-745	1 M			
R919	1-244-694	7.5 k			
R920	1-221-967	10 k (B), semi-fixed			
R921	1-202-623	120 k		½W	composition
R922	1-244-701	15 k			
R923	1-244-701	15 k			
R924	1-244-712	43 k			
R925	1-244-677	1.5 k			
R926	1-221-967	10 k (B), semi-fixed			
R927	1-244-711	39 k			
R928	1-217-008	1.2		3W	wire-wound
R929	1-244-625	10			
R01 (R51)	1-244-721-09	100 k			
R02 (R52)	1-244-714-09	51 k			
R03 (R53)	1-244-725-09	1 M			
R04 (R54)	1-244-681-09	2.2 k			

Ref. No.	Part No.	Description	
R05 (R55)	1-244-733-09	330 k	
R06 (R56)	1-244-735-09	390 k	
R07 (R57)	1-244-714-09	51 k	
R08 (R58)	1-244-722-09	110 k	
R09 (R59)	1-244-725-09	150 k	
R10 (R60)	1-244-625-09	10	
R11 (R61)	1-210-506	10 k	±1%
R12 (R62)	1-244-662	360	
R13 (R63)	1-244-668	620	
R14 (R64)	1-244-672	910	
R15 (R65)	1-244-676-09	1.3 k	
R16 (R66)	1-244-682-09	2.4 k	
R17 (R67)	1-244-683-09	2.7 k	
R18 (R68)	1-244-713-09	47 k	
R19 (R69)	1-244-699-09	12 k	
R20 (R70)	1-244-694-09	7.5 k	
R21 (R71)	1-244-688-09	4.3 k	
R22 (R72)	1-244-680-09	2 k	
R23 (R73)	1-244-669	680	
R24 (R74)	1-244-669	680	
R25 (R75)	1-244-675-09	1.2 k	
R26 (R76)	1-244-679-09	1.8 k	
R27 (R77)	1-244-683-09	2.7 k	
R28 (R78)	1-244-687-09	3.9 k	
R29 (R79)	1-244-696-09	9.1 k	
R30 (R80)	1-244-718-09	75 k	
R31 (R81)	1-244-716-09	62 k	
R32 (R82)	1-244-712-09	43 k	
R33 (R83)	1-244-708-09	30 k	
R34 (R84)	1-244-703-09	18 k	
R35 (R85)	1-244-698-09	11 k	
R36 (R86)	1-211-913	1 k	±1%
R37 (R87)	1-210-506	10 k	
R38 (R88)	1-210-505	4.7 k	±1%
R39 (R89)	1-210-509	33 k	
R40 (R90)	1-244-698-09	11 k	
R41 (R91)	1-244-689-09	4.7 k	
R42 (R92)	1-210-502	2.2 k	
R43 (R93)	1-210-506	10 k	±1%
R44 (R94)	1-210-505	4.7 k	
R45 (R95)	1-210-502	2.2 k	
R46 (R96)	1-244-715-09	56 k	
R47 (R97)	1-244-697-09	10 k	
R48 (R98)	1-244-697-09	10 k	
R49 (R99)	1-244-742-09	750 k	
R50 (R100)	1-244-719-09	82 k	
R1001(R2001)	1-244-657	220	
R1002(R2002)	1-244-685-09	3.3 k	
R1003(R2003)	1-244-711	39 k	
R1004(R2004)	1-244-745	1M	
R1005(R2005)	1-244-745	1M	
R1006(R2006)	1-244-733	330 k	
R1007(R2007)	1-244-649-09	100	
R1008(R2008)	1-211-913	1 k	±1%
R1009(R2009)	1-211-913	1 k	±1%

Ref. No.	Part No.	Description
VR1	1-222-461	resistor, variable 100 k (B)/100 k (B) (PHONO-2 LEVEL Adj.)
VR2	1-222-462	resistor, variable 250 k (B)/250 k (B) (TUNER LEVEL Adj.)
VR3	1-222-462	resistor, variable 250 k (B)/250 k (B) (AUX-1 LEVEL Adj.)
VR4	1-222-462	resistor, variable 250 k (B)/250 k (B) (AUX-2 LEVEL Adj.)
VR5	1-222-462	resistor, variable 250 k (B)/250 k (B) (TAPE-1 LEVEL Adj.)
VR6	1-222-458	resistor, variable 100 k (A)/100 k (A) (MIC LEVEL control with switch S15)
VR7	1-222-459	resistor, variable 250 k (M)/250 k (N) (BALANCE control)
VR8	1-221-843	resistor, variable 250 k/250 k (VOLUME control)
VR9	1-222-460	resistor, variable 100 k (B)/100 k (B) (HEADPHONE LEVEL control)

SWITCHES

Ref. No.	Part No.	Description
S1	1-514-823	switch, rotary (FUNCTION 1)
S2	1-514-824	switch, lever/rotary (FUNCTION 2)
S3	1-514-825	switch, lever/rotary (MONITOR)
S4	1-514-649	switch, rotary (MODE)
S5	1-514-647	switch, lever/rotary (TONE CANCEL)
S6	1-514-826	switch, rotary (TONE control, TREBLE)
S7	1-514-827	switch, rotary (TONE control, BASS)
S8	1-514-647	switch, lever/rotary (TURNOVER FREQuency, TREBLE)
S9	1-514-647	switch, lever/rotary (TURNOVER FREQuency, BASS)
S10	1-514-828	switch, rotary/slide (IMPEDANCE SELECT)
S11	1-514-829	switch, rotary (FILTER)
S12	1-514-830	switch, rotary (METER LEVEL)
S13	1-514-314	switch, slide (OUTPUT LEVEL)
S14	1-514-369-13	switch, lever (POWER)

Ref. No.	Part No.	Description
		MISCELLANEOUS
CP1	1-101-534	encapsulated component, 120Ω + 0.1μF
CP2	1-231-057	encapsulated component, 120Ω + 0.033μF
	1-507-162	phono jack, 10-P
	1-507-163	phono jack, 4-P
	1-507-170	jack, AUX 3 input
	1-507-176	phono jack, 1-P
	1-507-190-12	jack, HEADPHONE
	1-507-279	jack, MIC input
	1-507-338	PCB socket
	1-509-029	REC/PB socket
	1-509-341	AC socket
	1-515-156	relay, REL-1
	1-518-070	lamp, meter 8V 0.3A
	1-524-080	LEVEL meter
	1-526-165	voltage changeover block
	1-532-248	fuse, 1A
	1-533-051-13	socket, meter lamp
	1-534-487	cord, power
	1-536-178	terminal strip, 1L(C)
	1-536-182	terminal strip, 2L2(C)
	1-536-189	terminal strip, 1L(B)

SONY®

TA-2000F

General Export Model

No. 1
July, 1971

SERVICE MANUAL SUPPLEMENT

Subject: Changes on Model TA-2000F and Service Manual Correction

1. INTRODUCTION

SONY has changed the design of knobs equipped in TA-2000F as given in Table below. Note that the new knob is a serrated type as illustrated. In addition, some transistors are changed in the amplifier section. Notice that there is printing error concerning Idss rank illustration in the service manual. To avoid confusion make the following correction.

2. DESCRIPTION OF THE MODIFICATIONS

2-1. NEW KNOB

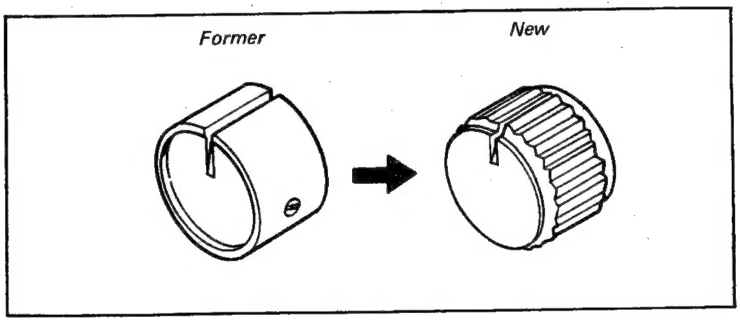


TABLE 1. PARTS CHANGED

Description	*Parts Number*	
	Former	*New*
VOLUME, TONE(BASS, TREBLE) control knobs, FUNCTION, MODE switch knobs	X-20299-04	X-48049-04
BALANCE control knob, HEADPHONE, METER, FILTER, MIC LEVEL knobs, IMPEDANCE SELECTOR knob	X-20519-03	X-48066-11

Applicable Serial Numbers

500,201 and later

Interchangeability

New and old knobs are not interchangeable.

2-2. PARTS CHANGED

Some transistors employed in the amplifier have been changed. Only the new transistors are available for repair work.

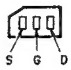
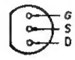
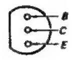
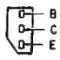
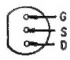
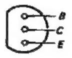
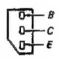
Reference Number	*Former Type*	*New Type*
Q102(Q202), Q305(Q405), Q501(Q601), Q502(Q602), Q504(Q604), Q505(Q605)	 S G D **2SK35-11, -21(FET)**	 G S D **2SK43-1(FET)**
Q101(Q201)	 S G D **2SK35-13, -23(FET)**	 G S D **2SK43-1(FET)**
Q104(Q204), Q307(Q407)	 B C E **2SA611**	 B C E **2SA705**
Q303(Q403)	 S G D **2SK35-13, -23(FET)**	 G S D **2SK43-3(FET)**
Q912	 B C E **2SA611**	 B C E **2SA678**

Fig. 1. Former and new type transistors

Applicable Serial Numbers

500,301 and later

Interchangeability

New and old type transistors are mutually interchangeable.

3. CORRECTION

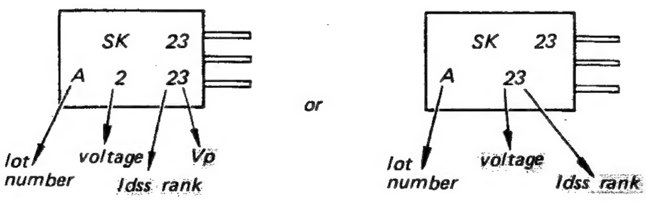
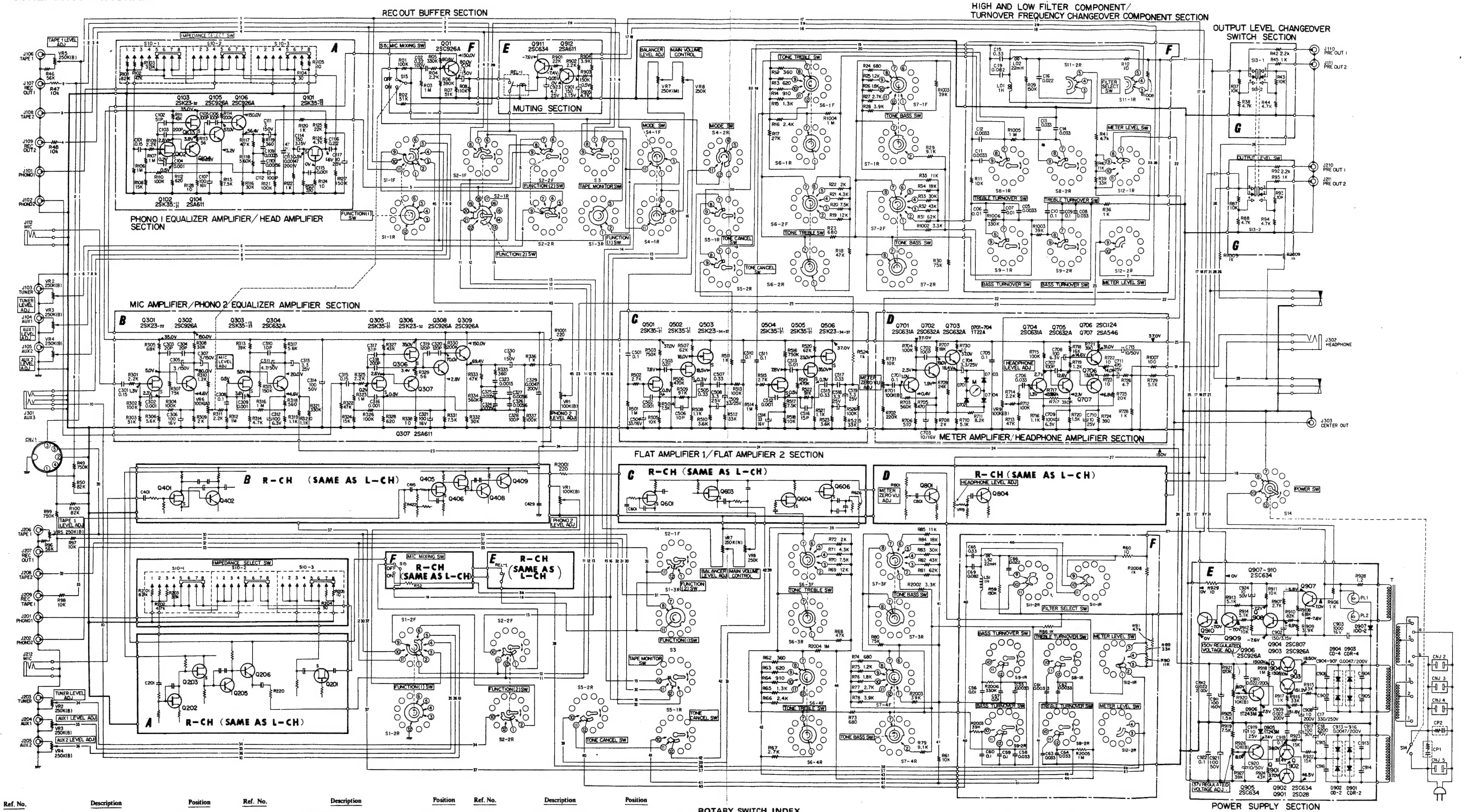


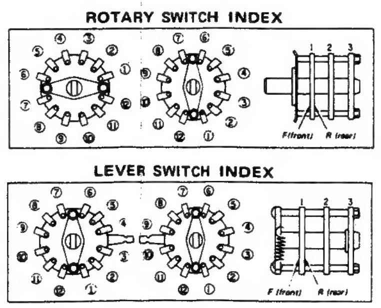
Fig. 2. Example of Idss rank

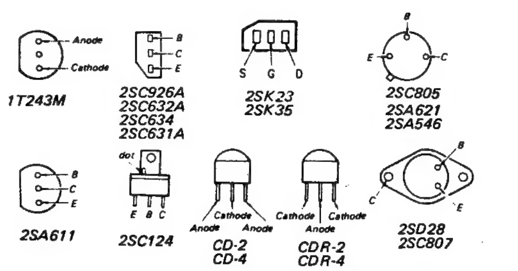
Note: should be corrected.

SCHEMATIC DIAGRAM



Ref. No.	Description	Position	Ref. No.	Description	Position	Ref. No.	Description	Position
S1	FUNCTION (1) SW (MIC - PHONO 2 - AUX 1 - AUX 2 - AUX 3 TAPE TO TAPE 1-2, - TAPE TO TAPE 2-1)	MIC	S6	TONE TREBLE SW	-10 dB	S12	METER LEVEL SW (MIC - 0 dB - (-10 dB) - (-20 dB))	MIC
S2	FUNCTION (2) SW (TUNER - FUNCTION (1) - PHONO 1)	FUNCTION (1)	S7	TONE BASS SW	-10 dB	S13	OUTPUT LEVEL SW (1 V - 0.3 V)	1 V
S3	TAPE MONITOR SW (TAPE 2 - SOURCE - TAPE 1)	SOURCE	S8	TREBLE TURNOVER SW (2.5 kHz - 5 kHz)	2.5 kHz	S14	POWER SW (ON - OFF)	OFF
S4	MODE SW (CHECK "L" - CHECK "R" - REVERSE - STEREO - L+R - LEFT - RIGHT)	REVERSE	S9	BASS TURNOVER SW (500 Hz - 250 Hz)	500 Hz	S15	MIC MIXING SW (ON - OFF)	OFF
S5	TONE CANCEL SW (TONE ON - CANCEL)	TONE ON	S10	IMPEDANCE SELECTOR SW	10Ω			
			S11	FILTER SW (LOW (50 Hz) - OFF - HIGH (9 kHz) - BOTH)	LOW (50 Hz)			





Note:
All resistance values are in ohms.
k = 1,000, M = 1,000 k
All capacitance values are in μF except as indicated with p, which means μμF.
All voltages represent an average value and should hold within ±20%.
All voltages are dc measured with a VOM which has an input impedance of 20 k ohms/volt. No signal in.

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